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An examination of the physical and temporal parameters of post-physical printmaking practice: exploring new modes of collaboration, distribution and consumption resulting from digital processes and networked participation.

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A thesis submitted in partial fulfilment of the requirements of Robert Gordon University for the degree of Doctor of Philosophy.

February 2014

Abstract

This research was initiated by questions raised from the researcher's professional activities in fine art printmaking and examines, through contextualised artistic practice and critical enquiry, redefinitions in the physical and temporal parameters of digitally mediated fine art printmaking caused by developments in digital media; specifically the impact of digital culture, Web2.0, social networking, augmented and virtual reality. Grounded on critical contextual review the research explores, through contextualised research probes, the notion of post-physical practice and the impact of new modes of collaboration, distribution and consumption on contemporary printmaking. It includes the findings of an international, digitally mediated, participatory and collaborative exchange survey of contemporary digital print, developed through direct enquiry using social media as a research tool. Philosophical questions about the impact of e-culture, post-physical working and new modes of print-based artistic practice were examined, as well as the indexicality of the print itself in augmented and virtual contexts. The research employs dynamic triangulation between critical contextual review and direct qualitative and practice-based research; to develop a taxonomy framing the contextual precedents of digital printmaking, pinpointing key markers of transition between traditional and new printmaking. It uses post-studio methods and explores the conception, production, editioning, collection and ownership of print in an increasingly networked digital age, providing proof of concept and exploring virtual immersive surfaces in printmaking. These lead to the development of new models for a second generation of printmaking practice or Printmaking2.0 expressly founded in post-physical practice in a post-studio context and embracing the lingua franca of contemporary digital practice in the production of born digital virtually imprinted forms. In both, the technical practice of post-physical printmaking and the significant artistic implications resulting from the cultural shifts following digital participation and post-physical embodiment.

Keywords

Digital, Printmaking, Printmaking2.0, Art, Post-physical, Augmented, Virtual, Reality, Social, Networks,

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Finally my inestimable thanks go to Maureen Thompson for her constant and long-suffering support throughout this journey, without which it could never have come to completion.

Dedication

Dedicated to the memory of Peggy and Harry Thompson

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Portfolio of Artistic Practice and Public Outputs

A digital portfolio of the associated websites and researcher's artistic practice and public output accompany this thesis as a Data CD containing the following materials:

- Artistic Practice - Research Probe 1 Digital Print Exchange
- Artistic Practice - Research Probe 2 Code as Process
- Artistic Practice - Research Probe 3 The Print as Portal
- Artistic Practice - Research Probe 4 "Picture Space - Walking in a Garden of Forking Paths"
- Public Output - Paper - Born Digital* New Materialities
- Public Output - Paper - Social Networking and Affinity Spaces
- Public Output - Paper - The Digital Matrix and the Paperless Print
- Public Output - Paper - Walking in the Garden of Forking Paths – examining notions of 'post-physical' printmaking in digital space.
- Public Output - Probes Exposition
- Public Output - Seminar

Video Resources

Associated video recourses for this research accompany this thesis as a DVD disks containing the following materials:

DVD1 Video Resources: Probes Exposition & Demonstration of Research Probe 3

DVD2 Video Resource: Dart Seminar 11/5/2012

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1.0 Introduction¹

1.1 Rationale for the research

This research is founded on questions raised through the researcher's professional activities: 30 years experience as a printmaker, research during postgraduate studies for an MA in Digital Arts with Distinction at Camberwell College of Arts and teaching contemporary art practice at Forth Valley College. The researcher became cognisant of how the physical and temporal* boundaries of printmaking are being redefined by rapid developments in the technical practice of digital processes and cultural shifts from mass digital participation, which have implications for the artist and their practice. Questions arise as to: what are the physical and temporal boundaries of these new digitally transferred images and what are the implications for the conception, production, editioning, collection and ownership of "print*" in the digital age?

These broader questions are set against redefinitions of the materiality* of the artistic statement and the authenticity, authority and ownership of digitally mediated art. Increasingly mediated and networked 'Post McLuhan' audiences gather digital images in their personal digital spaces as never before. Rapidly developing flat screen and projection technologies, electronic surfaces, are now common in personal life and the private collector has the opportunity to amass, view and share the digitally mediated print in wholly new ways. These technological and cultural developments raise questions about the audience's cultural perspectives of the physical and temporal nature of printmaking and, hence, the role of the fine art printmaker in post-physical* digital space. The traditional idea of 'audience' and 'recipients' may be being replaced by that of 'percipients', capable of participative engagement rather than passive absorption amid

¹Readers Note: terms marked with an asterisk* (on first occurrence) are listed in the A-Z Glossary/Definition of terms beginning on p.230.

the erosion of the once special characteristics of 'Aura'* and connoisseurship, re-establishing Benjamin's concept of: "a work of art's unique existence at the place where it happens to be" (Benjamin, 1936).

This research is primarily concerned with questions surrounding the practice of digitally mediated printmaking and its intended primary audience is the printmaking community (practitioners and students); but understanding of digital culture, the post-physical condition, augmented reality and authenticity may also be significant to audiences in the broader community.

Consequently these questions surrounding the context, roles, relationships and structures surrounding the practice of printmaking form the rationale for this research and are the basis for its research aim and objectives.

1.2 The researcher's previous experience

The researcher is a practising printmaker experienced in contemporary art practice, applied industrial arts and design. His printmaking* practice was founded in traditional art school training during the 1970s, beginning with training as part of art school studies and expanded through membership of Sunderland Arts Centre, with later study in print for textile and surface pattern as part of his first degree. He was proactive in creative digital practice development, applying FORTRAN in the generation of geometric forms 1979 and exploring micro computer processing in graphic visualisation (during his first MA degree 1980-82). The researcher has 30 years experience as an art and design lecturer teaching printmaking, digital arts, fine art and design at all tertiary education levels, from art foundation to honours degree and postgraduate supervision. He continues to develop his artistic practice through studio activity and exhibition, continues to teach and was elected to professional membership of Visual Arts Scotland by exhibition and peer review. He undertook practice led research based projects during postgraduate studies for the award of his second MA in Digital Arts (with Distinction) at Camberwell College of Arts, after developing digitally mediated practice and its application in studio printmaking. At this time the researcher participated in digitally mediated

practice with international artists from Japan, Malaysia, India, Germany, Greece, America and the UK. The group were able to work collaboratively, make and exhibit their art practice, join lectures and even hold a party through 'Second Life' using digital technology. They also shared the highs and lows of life, births, deaths, engagements, success and failure supporting each other in cyberspace; living a real life in virtual space across time zones.

This blended experience, teaching, academic research and artistic practice and the researcher's experience of post-physical practice was fostered by concepts of a post-studio* environment. This included the use of digital process in his printmaking practice and raised questions as to the possibilities of a 'Digital Matrix*', as a counterpoint to the traditional print matrix and a possible evolution of a second generation of printmaking or Printmaking2.0*, resulting in post-physical print forms.

1.3 Research aims and objectives

1.3.1 Research aim

Examine through contextualised practice* and critical enquiry how the physical and temporal parameters of a post-physical printmaking practice are being redefined by rapid developments in both the application of digital processes in making, and the cultural shifts in practice resulting from digital participation.

1.3.2 Research objectives

Through contextualised practice and critical enquiry:

- 1. *Examine new boundaries of the print artefact (permanence*, materiality, authenticity, authorisation* and consumption) against the dialectic of physical and post-physical practice*.***
- 2. *Examine the effects of digital* participation through Web2.0*, online networking* and social media on collaboration*, distribution and consumption within contemporary printmaking practice.***
- 3. *Establish the contextual precedents of digital printmaking* practice, pinpointing key markers of transition between traditional and new printmaking.***

In order to examine and test the aim and objectives of this research a series of research probes have been developed. This methodology has been a 'blended' one, set against the contextual review and researchers own practice led research. The four custom probes (Probe1 p.119, Probe2 p.123, Probe3 p.124 and Probe4, p.125), are used to examine and test the aims and objectives in detail: *Objective 1* - used all four of probes; *Objective 2* - was examined through probes 1,2 and 4, whilst *Objective 3* - was examined through probe 1 only. The 'blended' nature of this research: contextual review, research probe[s], and researchers own practice should be viewed holistically, a map or 'Topoi' of these

research elements, as they relate to the primary research activities can be seen on page 109, Figure 36, *Section 3.0 Methodology and Data Gathering* section.

1.4 Research approach/paradigm of inquiry

An initial study of Gray & Malin's: "Visualizing Research: A Guide to the Research Process in Art and Design", provided a tabular comparison (Gray and Malins, 2004') of accepted research paradigms from which further study was undertaken of: "The Paradigm Dialog", (Guba, 1990'). A Constructivist approach was adopted and the research aim was contextualized against the forms and structures of artistic practice, based on the researcher's previous experience as a critically engaged practitioner and a previous practice led research project with Camberwell College of the Arts/UAL.

Thus a Relativist Ontology* in which: "Realities exist in the form of multiple mental constructions, socially and experientially based, local and specific, dependent for their form and content on the persons who hold them." (Guba, 1990') has been adopted. This model reflects the multiplicities of artistic structures, constructs and philosophies (see Section 3.1 Introduction).

Constructivism is founded on a Subjectivist epistemology where: the "inquirer and inquired are fused into a single monistic entity. Findings are literally the creation of the process of interaction between the two." (Guba, 1990'). This is reflected in the practice-led action research methodology* adopted in this study (see Section 3.2 Data Generation).

Within the constructivist paradigm a Dialectic Methodology is espoused, in which: "individual constructions are elicited and refined hermeneutically, and compared and contrasted dialectically, with the aim of generating one (or a few) constructions on which their substantial consensus." (Guba, 1990') This model reflects art practitioners' adoption of research through art practice and qualitative research, in the generation of the research

constructs in this study (see Section 3.2.2 Research Probes* practice-led exploration of printmaking in digital space).

The authors of "Visualizing Research: A guide to the research process in art and design" hypothesise a possible "artistic?" paradigm with empty cells in their table in Figure 1.2 Paradigms of inquiry (adapted from Guba, 1990) (Gray and Malins, 2004'). Now a decade later, as a consequence of the exponential growth of practice-led research in the creative arts and design, a substantial body of published research provides the basis for a clearer definition of artistic research. Current academic discourse in the broader community continues to examine and evolve the artistic research paradigm, for example the "AHRC Research Review of practice-led research in art, design and architecture" (2007). The general increase in the registration of practice-led research degrees identify that this research is clearly grounded in ontology, epistemology* and methodologies. In the design of this research, both the qualitative research (p.116) and research through practice (p.119-127) were founded in and directed by the Critical Contextual Review* (p.19); forming a triangulated approach as illustrated in Figure 1 below:

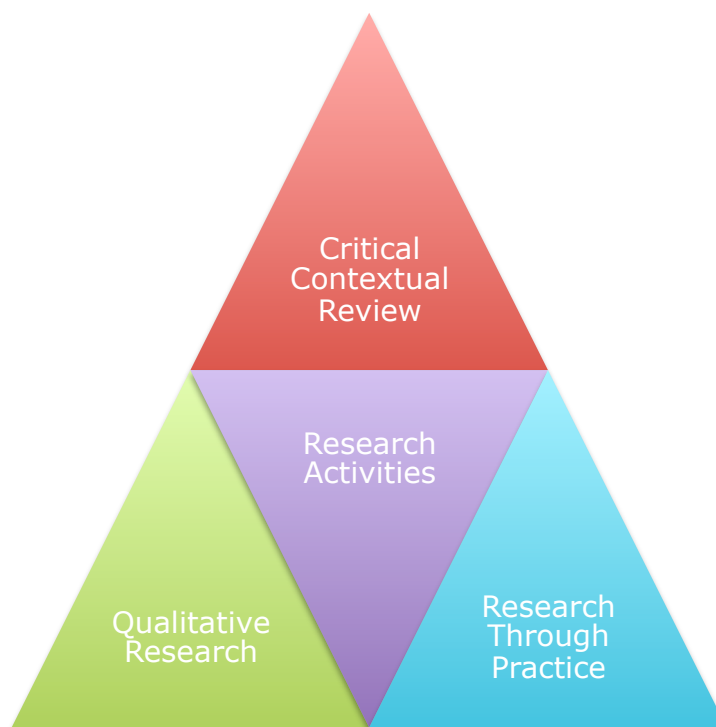


Figure 1: Triangulated Research Approach

2.0 Critical contextual review

2.1 Introduction

This review is the foundation for the research and establishes the contexts from which its argument is developed. The researcher adopted models for literature review proposed by (Murray, 2002') and (Hart, 2005') adapted to suit the needs of broader critical contextual review necessary for art practice-led research (Gray and Malins, 2004'). The review is based on critical examination of materials drawn from a range of books, journals, theses, conference proceedings, e-resources and exhibition publications and non-written sources such as artworks, exhibitions, audio recordings and video recordings.

Methodologically the critical and contextual review is based on the Paradigm of Inquiry and adopts a constructivist approach, as described in Section 1.4. The review examines the contextual material from a relativist stance using a hermeneutic, dialectic methodology considering, reflecting on and analysing the printmaking practice of both the researcher and the international print community.

Initial search, selection and collation of contextual materials were produced from over 560 possible sources/references. The need for a scoping mechanism was identified through extended reading, study and additional research. Consequently the Topoi* of Review were developed and mapped against the stated research objectives.

This research is founded on questions surrounding notions of a 'Digital Matrix' and post-studio second-generation printmaking (Printmaking2.0), from which the research aim and objectives were established and are identified in Section 1.3. The researcher identified four key and interconnected fields or Topoi* relative to the research aim and objectives. Firstly three principal fields: Materiality and Signature (Objective 1), Modes of Consumption (Objective 2) and Emergent Forms (Objective 3). These inform the remaining Topoi: the philosophical context of the digitally

mediated art object (see Figure 2: The Topoi of Review), so the review is then located within this contextual landscape.

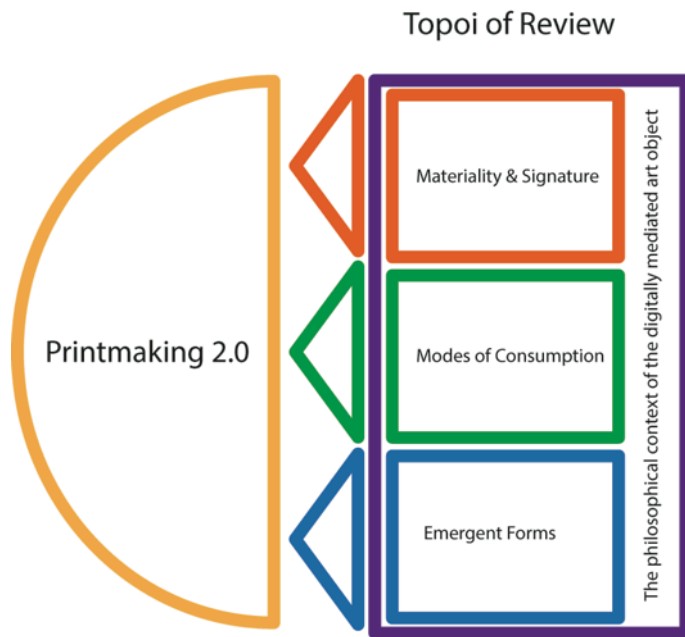


Figure 2: The Topoi of Review

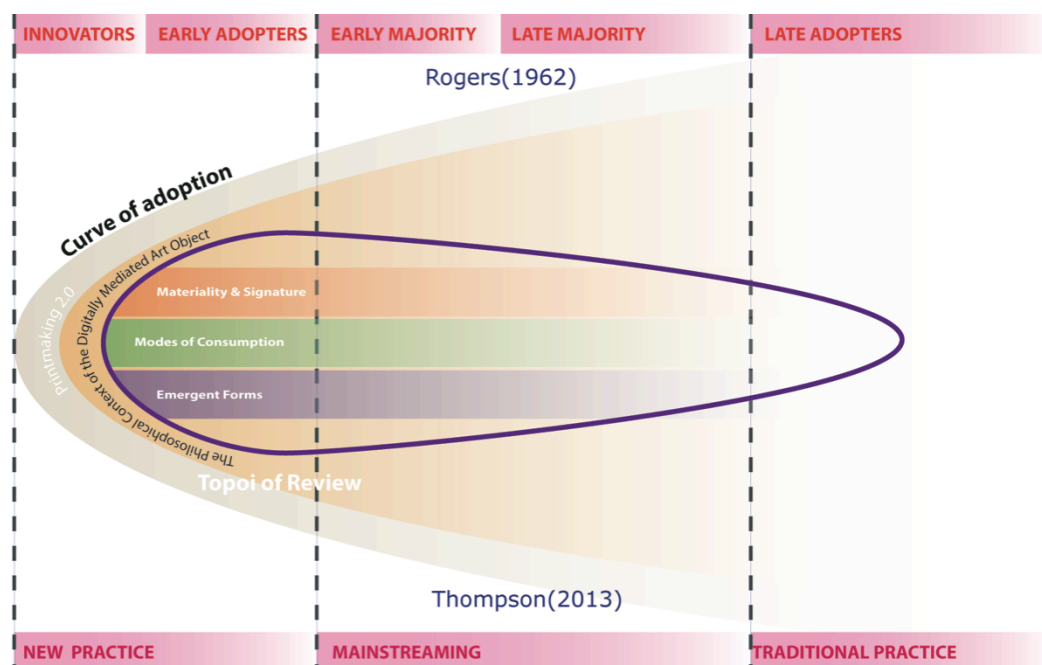


Figure 3: Innovation adoption curve for digital printmaking – Thompson (2013) after (Rogers, 2003')

Printmaking2.0 and the Topoi of Review were used as the scoping mechanism to refine the collected contextual materials against the research

aim and objectives. These findings made it necessary to filter the contextual materials to pinpoint key markers of transition between traditional and new printmaking. To do this, an innovation adoption curve for digitally mediated printmaking practice (see Figure 3 p.20) based on Rogers Adopter Categorisation Curve (Rogers, 2003') was developed and this model was used in the filtering process², providing an analytical model which reflected the relationship between evolving and existing practices in the medium (see Figure 34, p.81).

Thus the boundaries of contextual review were more clearly established through applying the curve model and its use as a critical metric set against notions of Printmaking2.0 (section 2.2 p.23), the Topoi of Review, materiality and signature (section 2.3 p.35), modes of consumption (section 2.4 p.48), emergent forms (section 2.5 p.64), and the philosophical context of the digitally mediated art object (section 2.6 p.87). The Topoi of Review and consequent subsets were refined and mapped to the research objectives (see below) through this process.

²Roger's Diffusion of Innovation is not the only model, but it has become established as "the leading and most influential model" in "technology adoption research" (Deibel, K.N. 2011).



Figure 4: Map of Topoi of Review against Research Objectives and Sections of Contextual Review

2.2 Printmaking2.0 - The digital matrix: philosophy and context

2.2.1 Introduction

As discussed in in Section 1.0 the researcher's experience of post-physical practice, in a post-studio environment using digital process in his printmaking practice raised the possibilities of a 'Digital Matrix' as a counterpoint to the traditional print matrix and the possible evolution of a second generation of printmaking or Printmaking2.0. Contextual and literature review of contemporary printmaking practice were undertaken in order to explore and frame these notions, and a 'Taxonomy of Contemporary Printmaking' was developed, (see Figure 5 below).

The proposed contemporary printmaking taxonomy and its constituent artistic practices may be categorised into four domain matrices:

1. Traditional printmaking - direct matrix
2. Traditional printmaking – transferred matrix
3. Digital printmaking – electromechanical matrix
4. Printmaking2.0 – digital matrix

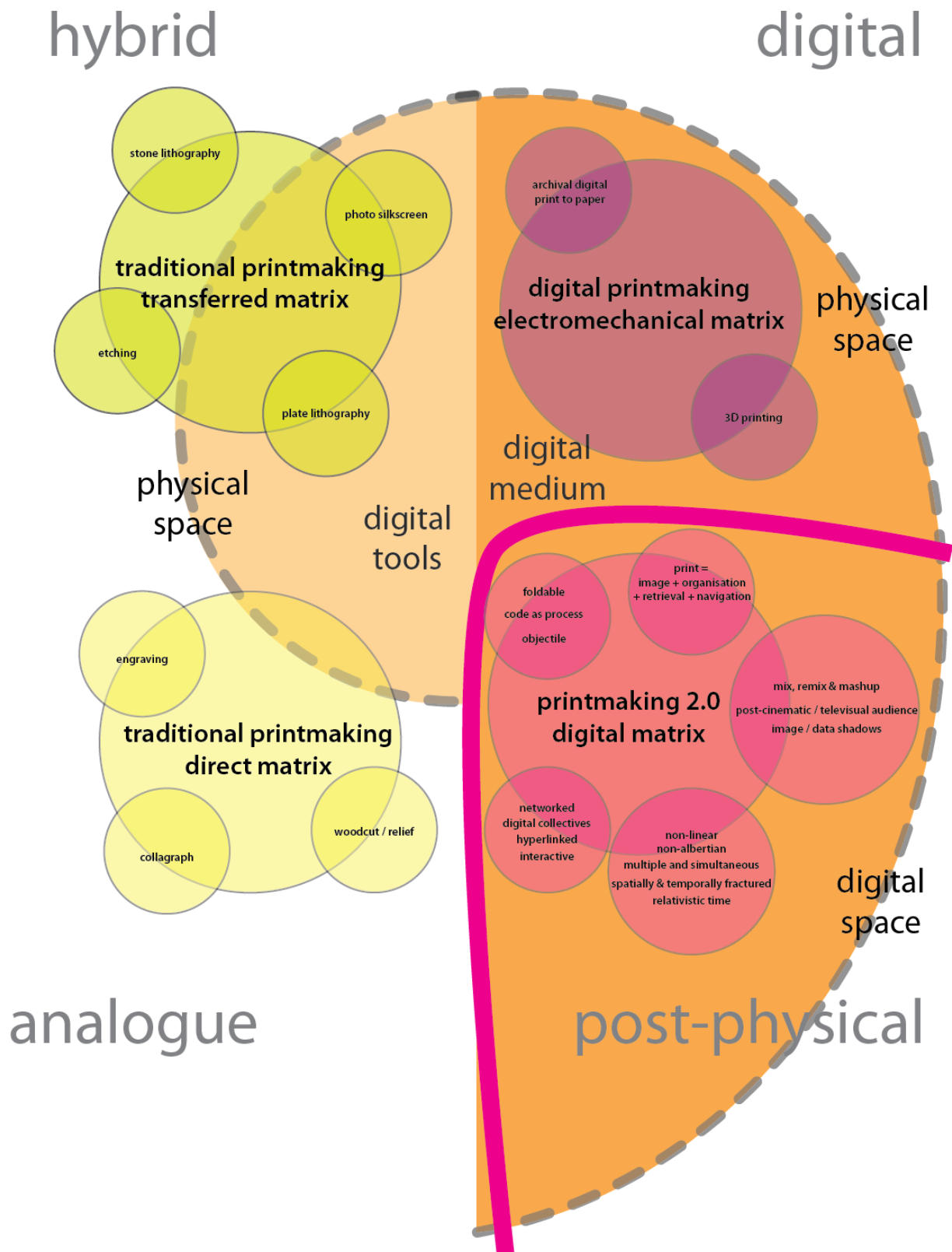


Figure 5: Taxonomy of contemporary printmaking practice.

2.2.2 The traditional matrix and physical space

Traditional printmaking practices may be seen to occupy two domain matrices: Direct (physical) and Transferred (chemical), which occupy physical space. These matrices are by definition: "the physical surface from which an image is printed: woodblock, plate, stone or screen" (Wye, 2004'). Conceptually this matrix is the meeting of artistic intention and acquired knowledge with physical materials and processes, which are made physical (printed) through physical mechanism. In the making of traditional matrices digital processes are now commonly used for reprographic and manipulative purposes in the production of separations, photo-positives and negatives. In this context the computer and associated software replace the reprographic camera, photocopier and enlarger; however they are used as digital 'tools' rather than a medium. Examining printmaking through digital means reveals that, in addition to the use and development of 'digital tools' in traditional practice, there are the new domain matrices of digital printmaking (electromechanical matrix) and Printmaking2.0 (digital matrix).

2.2.3 Digital printmaking and physical space

Inherently the product of digital printmaking (electromechanical matrix) lies in physical space and there is a significant body of research and practice on the expression of printmaking through this digital medium. This domain is exemplified by the touring exhibition 3D 2D: Object and Illusion in Print: Prints from the Centre for Fine Print Research in Bristol (Thirkell, 2010').

In considering digital prints to two-dimensional physical surfaces and three-dimensionally printed forms the matrix is formed of the artistic intention and acquired knowledge of the artist, with physical materials and processes (paper or resin and pigmentation) and are made physical and imprinted through digital /electromechanical mechanisms (ink jet /3D printer).

2.2.4 The digital matrix and digital space

As the product of the digital printmaking (electromechanical matrix) is constituent of physical space, so the product of Printmaking2.0 (digital

matrix) (see Figure 5 [p.24]) occupies digital space, which is defined by Kilian as:

"... the set of all information in digital form. People can access this information space through digital interfaces. I (Kilian) use the definition of space since the set contains both information and a representation of the people accessing it" (Kilian, 2000' 118).

Digital space also contains representation of the people populating it, in both their "data shadow" (Westin, 1967') and the shadows formed of their shared images.

The printmaker/artist enters digital space and uses the digital matrix in this new context either by primary intention (through the hand of the print artist in making and publishing their work by digital means) or secondary intention (through scanning and online publishing of a once physical or material print), augmented by participation in digitally networked communities and image sharing libraries. Thus the print is created in a digital state (or undergoes a process of de-materialisation) and becomes temporal. As such the product of artistic intention and visual practice becomes 'code'.

Digital code: "is the language of our time" and "... produces a parallel digital universe that is stored in and dispersed through a gigantic network of databases around the globe." (Sonvilla-Weiss, 2010'). A 'parallel digital universe' that is 'omnipresent' which:

"... comes from the fact that a networked digital set of information is theoretical equally accessible (and viewable) in all its parts at all times. This means that all information is present everywhere in the space at all times" (Kilian, 2000' 118).

Thus printmaking in digital space presents new opportunities for the meeting of artistic intention and acquired knowledge through digital mechanism in a fluid, 'omnipresent', collective digital space.

Working within this domain constitutes the practice of second generation, post-physical printmaking or 'Printmaking2.0' for:

"...the 'post-cinematic' 'post-televisual' viewer (who) has new forms of ever-virtual mobility—new speeds of access to deep histories of images and text, newly mobilized screens that travel in airplanes and automobiles, screens that can be hand-held and wireless. (Friedberg, 2009').

In the practice of Printmaking2.0, print artists become:

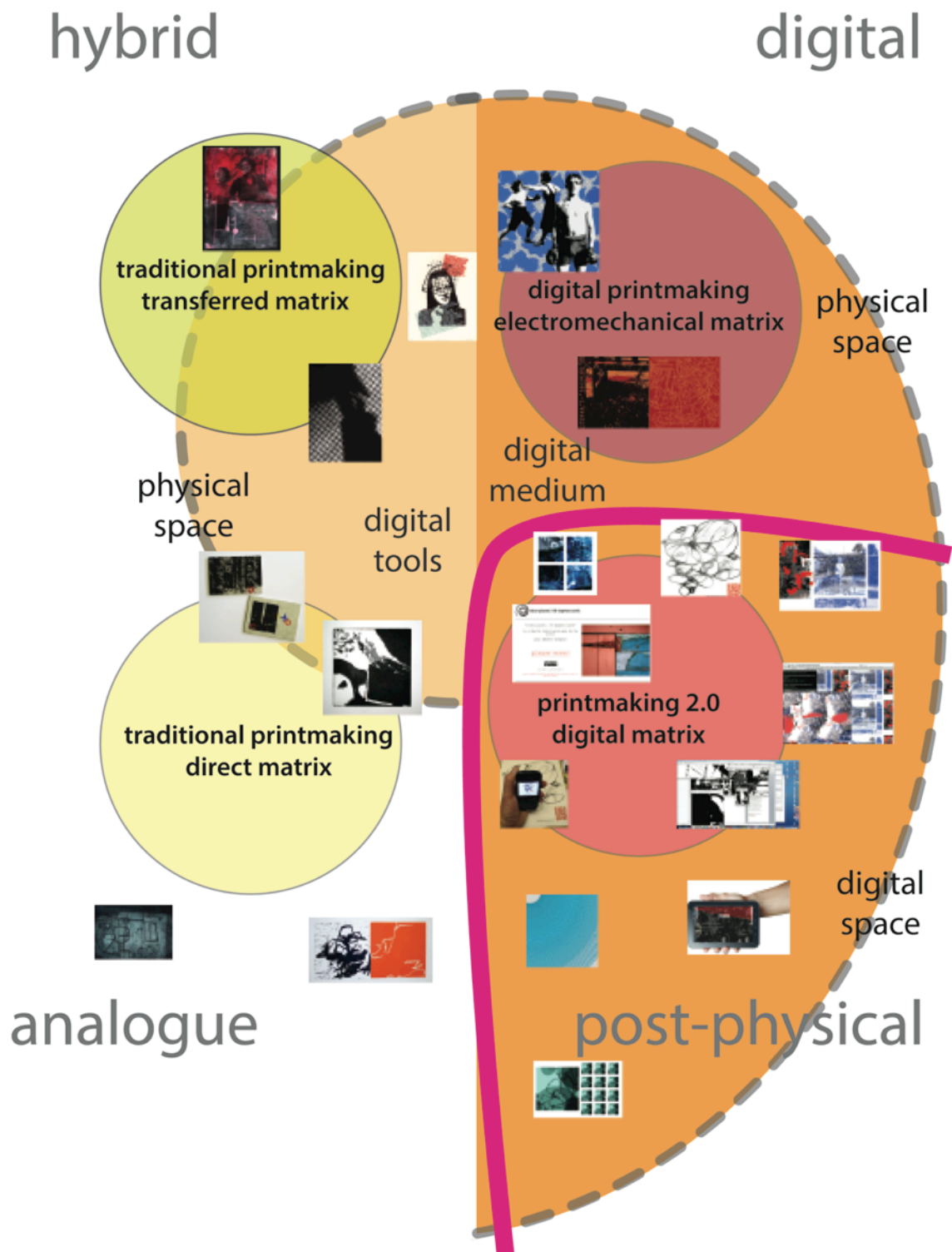
"Artists working with the net (and) are essentially concerned with the creation of a new type of aesthetic that involves not only a visual representation, but invisible aspects of organisation, retrieval, and navigation as well" (Vesna, 1999b').

2.2.5 Temporality and the digital matrix

Conceptually the products of traditional printmaking - direct matrix, traditional printmaking - transferred matrix, and digital printmaking - electromechanical matrix (see Figure 5 [p.24]) are fixed at the point of printing (instanting) and, although its content is perceived, it cannot influence the instancing of the statement (the now) which was made in the past and is thus absolute in Newtonian terms; these prints are temporally fixed. In the post-physical practice of Printmaking2.0 (digital matrix) works remain fluid in the digital content of the matrix and have the potential to be updated and re-worked. The percipient experiences content, in which they can influence the instancing of the artistic statement: 'the now'. A 'now': which is fluid and reflects a relativistic temporal model, where the print remains unfixed and capable of 'instanting' beyond the hand and even the lifespan of the original artist. As Kushner identifies:

"New technology demands new parameters of definition and a print does not need a fixed matrix, nor does it need to be a piece of paper physically pressed against a template." (Kushner, 2009').

Thus "It is in the code of search engines and the aesthetics of navigation that the new conceptual field work lies for the artist" (Vesna, 1999a').



Taxonomy of the researcher's personal practice and exploratory practice probes
Using Analogue / Hybrid / Digital / Post-physical Analysis Matrix

Figure 6: Analytical taxonomy of personal practice

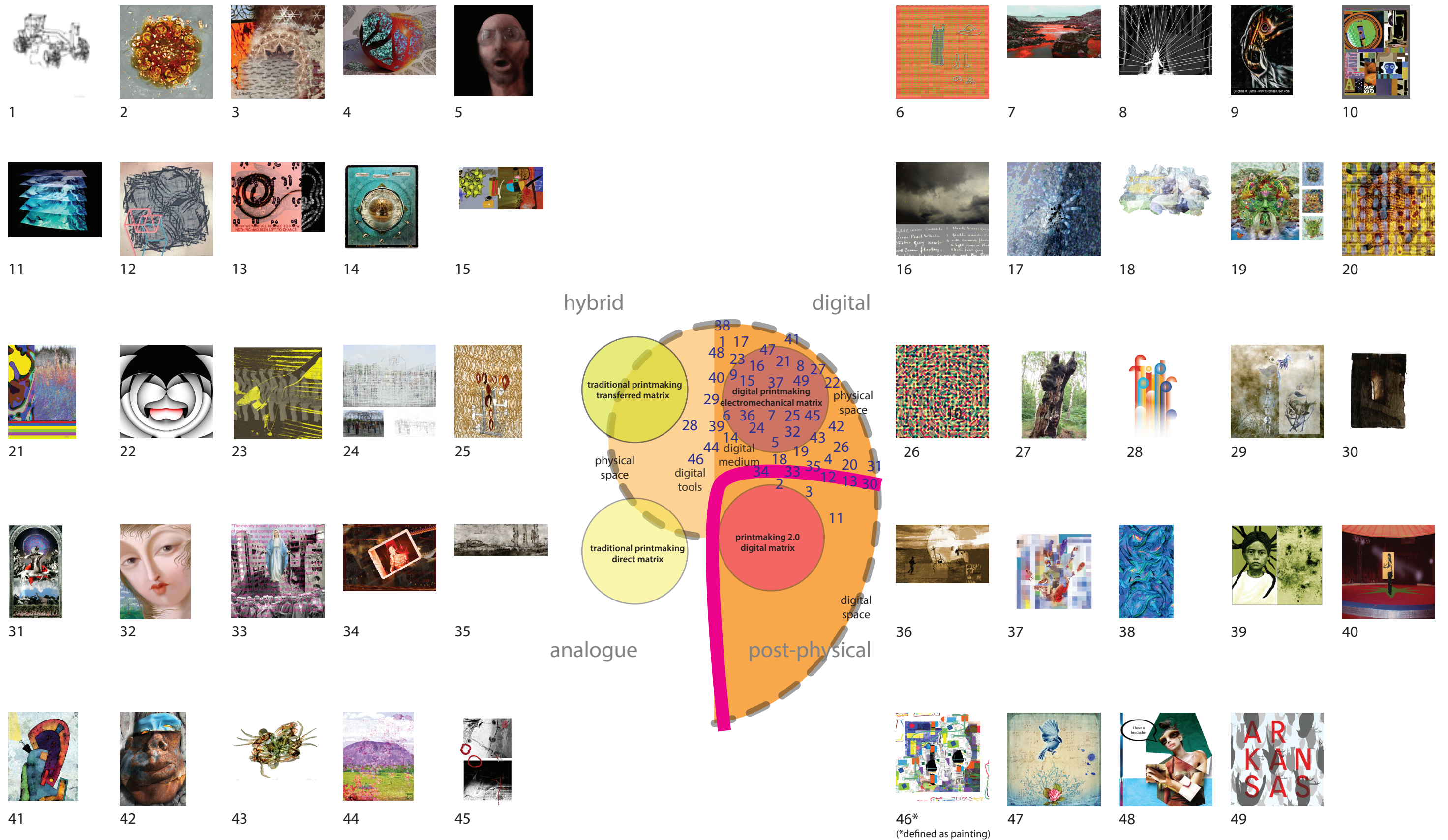
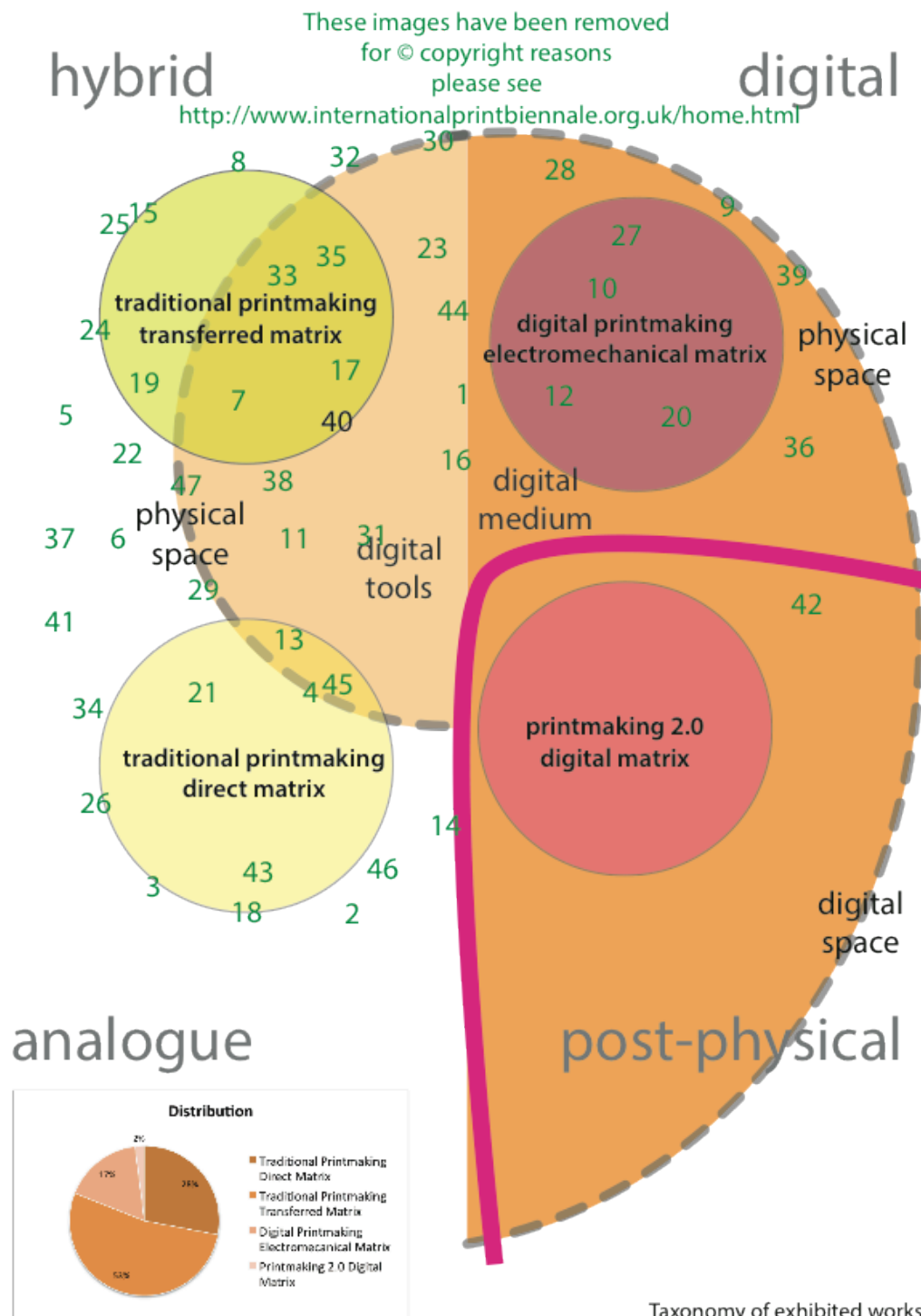


Figure 7: Analytical Taxonomy of Submitted Print Practice

Taxonomy of submitted works :
Practice Probe 1 - Born Digital New Materialities Digital Exchange portfolio
Using Analogue / Hybrid / Digital / Post-physical Analysis Matrix



Taxonomy of exhibited works at:
2011 International Print Biennale, Newcastle upon Tyne.
Using Analogue / Hybrid / Digital / Post-physical Analysis Matrix

Figure 8 Analytical Taxonomy of Contemporary Printmaking Practice³

³The list of Artists in Figure 8 is presented on the following page

List of artists & works referenced in Figure 8

1. Dawn Cole, Men Had Eyes Removed, 2009, solar plate etching, 49.5 x 50cm
2. Rew Hanks, Macquarie's Chair, 2011, linocut, 100 x 74 cm
3. Marta Lech, 3.06, 2010, linocut, 62 x 91cm
4. Katsutoshi Yuasa, Pseudo mythology #3, 2011, woodcut on paper, 243 x 488cm
5. Farniyaz Zaker, Untitled 3, 2000-2010, screen printing on hand woven carpets, 90 X 60 X 0.5cm
6. James Hugonin, Three Fluctuations in Contrary Rhythm, 2009, suite of three 30-colour screen prints, 74.8 x 65.4cm each, Ingleby Gallery
7. Stephen McNulty, No 9 from the Gloves Lost Series, 2010, screenprint and flock, 40 x 30 each
8. Danielle Abbiate, dark matter III, 2011, silkscreen print on paper, 88.9 x 88.9 cm
9. Eve Marguerite Allen, staircase going up, 2011, inkjet print on a4 sections, packing tape, 105 x 140 cm
10. Yiannis Baltagiannis I got a glimpse of you 2, 2011, photography and digital collage, 36 x 180cm
11. Ioannis Belimpasakis Untitled (from series On Resistance 01), 2009, photoetching and aquatint on steel plate, 130cm x 130cm
12. Derek Michael Besant, Nowhere #11, 2011, thermal uv ink transfer on synthetic paper, 86 x 120 x 5 cms, Icon Inc
13. Marcin Bialas, 25m2, 2010/2011, etching, dry point, mezzotint, 70 x 100 cm
14. Elizabeth Boast, Consequences, 2010, woodcut
15. Eirini Boutasi, catch me if you can, 2011, plate lithograph, 122 x 122 x 11 cm
16. Ian Brown, Natural Disaster variant II, 2009, screenprint, 153 x 102 cm
17. Carolyn Bunt, Kino International, 2010, C-type print diasec, 40.5 X 40.5 cm
18. Zenon Burdy, Five day on the lake 2, 2010, linocut, 100 x 64cm
19. Jake & Dinos Chapman Etchasketchathon 1, 2005, etching (heliogravure on chine colle), 29.5 x 29.7 cm, The Artists and Paragon Press
20. Paul Coldwell, Canopy I, 2011, laser cut relief and collage, 36 x 56cm
21. Marcel Cowling, Figure 7, 2011, monoprint and collage, 21 x 21cm
22. Danielle Creenaune, Cinco Piedras III, 2009, stone lithograph, chine colle, 22 x 27.5cm
23. Nicholas Devison, Second Sight, 2010, photoscreen and monoprint, 120 x 89cm
24. Michael Donnelly, Orion 5, 2009, etching and aquatint on copper, 17.5 x 17.5cm
25. Lauren Drescher, Tattoo Skin, hard ground, etchings, encaustic wax, 180 x 64 cm
26. Robin Dutton, Multi Apple Blossom I, 2007, lino, 91 x 61 cm, Tod White/Red Dot
27. Stefanie Dykes, Placing and Replacing, 2010, double sides digital prints, images bound as separate signatures with natural cotton fabric binding tape and displayed on wooden newspaper shafts, 33.02 x 88.9 x 7.62cm or 43.8 x 88.9 x 243.84
28. Mustafa Faruki, Celebatorium: 300, 2011, wide format digital print, rubber-stamped ink & transfer type, 27x42
29. Fatima Ferreira, 1 - lasting dream, 2011, aquatint and collage, 70 x 200 cm
30. Nick Fox, Echo, 2011, fused glass discs, enamel screen print, gold, carbon, talcum powder. (29 glass discs), 300 x 250 x 0.6 cm, Vane Gallery
31. Bodil Frendberg, Mick, 2011, photogravure, 24 x 29 x 3cm
32. Emmanuelle Giora, No Way Back, 2011, silkscreen, colour pencil, wood adhesive, 65 x 58cm (4 images)
33. Sarah Gittins, Kenyan Drought, 2010, screenprint on MDF, 106cm x 86cm x 12mm
34. Jessica Harrison, Touchstone (1), 2010, Kilkenny limestone, 55 x 55 x 55cm
35. Becky Houghton, Cold Splash, 2010, photo etching, 10 x 14 cm
36. Reetta Hiltunen, Reshuffle, 2010, giclee on cardboard box, 22.1cm x 14.8 cm x 10.6 cm cards - 21cm x 13.7cm
37. Cat Jensen, The German III, 2011, aquatint, hard ground, dry etching with hand colouring, 30.5 x 30.5cm
38. Debi Keable, Illusory Nature, 2011, screenprint on acrylic, 1 x 1.5m x 12 screens
39. Sunju Lee, A Practiced Place, 2010, digital print on monofilament, 60 x 100 x 5cm
40. Aoife McGarrigle, POW IV, 2010, photopolymer etching, 30 x 38 x 3cm
41. Mariana Moranduzzo, From Earth, 2011, etching and drawing on paper, 80 x 70 x 60cm
42. Janet Mullarney, Urban Print, 2009, video loop
43. Jennifer E Price, Dodge White, 2010, monoprint on fabric
44. Lihie Talmor, Track Before Detect 6, 2009, photo etching, 49cm x 37cm
45. Chris Thomas, Reykjavik Primaries 9, 2011, woodcut, 46.6 X 36.5 cm
46. Barthélemy Toguo Who is the true terrorist?, wooden print block, Galerie Lelong, Paris
47. Gethin Wyn Jones, Himalia, 2011, screen print on stainless steel with walnut frame, 18 x 29 x 3 cm

2.2.6 Non-Albertian space and multiple viewing planes

The digital matrix (see Figure 5 [p.24]) as a constituent of “digital space” (Kilian, 2000' p118) shares “the advantage (that) it puts few limitations on the amount of people sharing the same data” (Ibid). The meeting of digital space and audiences in these terms forms a new concept of the print matrix and consequently new conceptions of the viewing plane are required.

Traditional printmaking is founded in ‘Alberti’s Window’ a “Renaissance metaphor” which has “remained a defining concept for theories of painting, architecture, and moving-image media” (Friedberg, 2009'). Digital space is however no longer restricted to a single temporally fixed frame, as Friedberg identifies we now see the world through “‘virtual windows’ that rely more on the multiple and simultaneous than on the singular and sequential” (Friedberg, 2009'). The practice of contemporary printmaking (traditional and digital) is implicit with techniques of mixing original and appropriated images through collage and montage; which, when digitally mediated conform to ideas of the “Mashup” as defined by Sonvilla-Weiss, where elements are drawn from various digital sources and recreated to “create a whole new piece” (Sonvilla-Weiss, 2010').

The digital matrix is formed of the space of collected information ‘for’, ‘by’ and ‘about’ the post-physical printmaker, a conceptual “Wunderkammer” as defined by Buscher (et al) where individual portals in which “nearly every space we live in - be it work, home, travel or pleasure - is characterized by a digital layer.” (Ciolfi, 2011' 205-222) which frames the multiple and interlinked, digitally mediated ‘prints’ created by Printmaking2.0.

The domains bounded by the ranges between analogue and hybrid and digital and post-physical printmaking practice form two atelier types: traditional (analogue) and digital. The traditional atelier may be defined as the correlation between physical practice* and outputs through direct or transferred process, resulting in art objects resident in physical space. Conversely the digital atelier is the correlation between digitally mediated practice through either an electromechanical matrix with art objects

resident in physical space, or a digital matrix where the art objects occupy digital space and so constitute post-physical practice.

Once established the 'Taxonomy of Contemporary Printmaking' was tested against the researcher's own practice (see Figure 6 p.28) and then as a tool for the analysis of: Research Probe 1 born digital - new materialities digital exchange portfolio (Figure 7, p.29) and exhibited works at the 2011 International Print Biennale, Newcastle upon Tyne (Figure 8, p.31) in terms analogue/hybrid/digital/post-physical analysis matrices. The analysis tested the notion of 'the digital matrix' and Printmaking2.0 and identified gaps in current knowledge that the researcher's practice could explore via a series of research probes⁴ (see Section 3.0 p.107).

2.2.7 Summary of the digital matrix: philosophy and context

Analysis of the two atelier types within contemporary printmaking practice: 'traditional and digital' and their four domain matrices: 1) traditional printmaking - direct matrix, 2) traditional printmaking – transferred matrix, 3) digital printmaking – electromechanical matrix and the emergent domain 4) Printmaking2.0 digital matrix (see Figure 5 [p24]) revealed that digital printmaking through electromechanical matrix is now a significant and established practice. This analysis revealed the emergent domain Printmaking2.0 – digital matrix as a new area of knowledge, which presents a gap in knowledge needing to be examined by the researcher's practice and analysis of the practice of others. Consequently a series of research probes were designed to explore this new domain of practice (see Sections 3.4.1 Research Probe 1 "born digital – new materialities", 3.4.2 Research Probe 2 - Code as Process, 3.4.3 Research Probe 3 – The Print as Portal and 3.4.4 Research Probe 4 – Picture Space).

⁴Conceptually the probes are derived from the "cultural probe" model developed by William Gaver and they are specifically designed research tools. Gaver, B., Dunne, T. and Pacenti, E. 1999. Design: Cultural Probes. Interactions, 6, 21-29.

2.3 Materiality and signature in post-physical practice

'The digital' and the questions this raises in our ideas of process and cultural norms in the visual arts and their implied modes of communication. These might lead to conjecture that digitally mediated printmaking, with respect to post-modern⁵, virtual and post-studio practices becomes the exercise of a post-physical art process. In which, as Baudrillard identifies: "There is no real; there is no imaginary except at a certain distance." (Baudrillard, 1999') He then asks: "What happens when this distance, including that between the real and the imaginary, tends to abolish itself, to be reabsorbed on behalf of the model?" (Ibid). As identified by Besser:

"... electronic works (such as moving image materials, multimedia, interactive programs, and computer-generated art) have very different characteristics from physical artefacts (such as oil paintings, vases, sculptures, and manuscripts)" and "have more characteristics in common with performance art, conceptual art, site-specific installations, and experimental art" (Besser, 2001').

Buskirk identifies that: "Traditional views of art prescribe a relationship between medium, materiality and genre, which with the advent of postmodernism has become increasingly eroded"(Buskirk, 2003'). In this context there is a clear difference between haptic concepts of materiality in traditional printmaking and new conceptions of materiality in the digitally mediated practice of Printmaking2.0.

Although it is accepted that the traditional printmaker will continue to have concerns for materiality in their practice, which one practitioner [a respondent to primary research undertaken for this study (Thompson, 2009b')] described as: "the materiality of traditionally made prints - the

⁵Krauss suggests that postmodernism has "deconstructed" the "sister notions of origin and originality" KRAUSS, R. E. 1997. *The originality of the avant-garde and other modernist myths*, Cambridge, Mass.; London, The MIT Press. (p.170)

textures, embossing, marks, plate tone, even the smell.” It is equally valid that digital printmaking which “for the most part, is in fact created in a dynamic time-based interactive software-hardware environment” (Acevedo, 2003') evokes a different 'Aura'. Formed of new materiality through the “larger and more diverse world of replicable, transmissible, mediated art and communication” (Replicable/Transmissible Art*) described by Barfield, Barfield and Whale (2001). In this context the artwork may be made physical through 2Dimensional instantiation through large format archival print, paper and ink, 3Dimensional instantiation by 3Dimensional printing or rapid prototyping. Or, and more significantly, it may become part of a new physicality by electronic surface instantiation including e-publication, e-paper and digital surfaces and generating different concepts of the 'material' as sensory perceptions of the print and printmaking become significant.

A consequence of new forms of materiality in which the print has become “replicable, transmissible, mediated art” (Ibid) creates significant questions of allocation and signature. The boundary between virtual and physical space and signature becomes provisional and “the role of the signature as a paradigmatic link between hand and name is increasingly open to question” (Daniels, 1996') and consequently raise questions of 'allocation', the process or mechanism for apportioning rights of exhibition, distribution, use and re-use. There is a “historical precedent of assumptions as to the artists' rights or lack of them” (Jones, 2005') in the sale and distribution of their works and “consequent (erroneous) ideas of post-sale or publication rights of the artist being lost to the purchaser” (Buskirk, 2003'). Allocation and ownership is a historically complex question in printmaking. As Ivins identifies “once upon a time the signature of the draughtsman's original line was preserved in facsimile woodcuts” at its height in the 1500s, (Ivins, 1969'); Ivins also identifies “with the advent of the division of labour between the artist, the engraver's draughtsman, the engraver and the publisher, the signature of the original was lost to be replaced by the mark of the publisher” (Ibid).

The traditional western mechanism since the Renaissance for authorisation or sanction of artwork has been through signature (Daniels, 1996'). This

evolved historically as having particular significance in the practice of printmaking, as a result of the said 'division of labour between the artist, the engraver, the printer and the publisher'. The traditional link between signature and the authorisation of the artist come into question with the questions raised by digital process and its facility for repetition and duplication. It is against this context that developments first seen in the digital distribution of music by legal online sale and resale through mechanisms such as iTunes and Amazon become significant. New notions of digital allocation rights emerge and may provide practical methods for the sale, distribution, use and reuse of 'prints' through the digital medium.

Within traditional printmaking practice where digital is part of a process which results in printmaking through traditional means, accepted norms of signature and editioning are sufficient. However, as digital de-materialised mechanisms allow the printmaker to expand their instantiation methods beyond ink on paper, the need for new paradigms emerges.

2.3.1 Post-physical forms

The early part of the 21st century has seen the development of ubiquitous cultural medium⁶ engendering new ideas of society and the individual. A 'digital culture*', which according to Deuze "... can be seen as an emerging set of values, practices and expectations regarding the way people (should) act and interact within the contemporary network society" (Deuze, 2006' 63-75). The impacts of digital culture are now significant enough to warrant a recent report from the Chief Scientific Adviser to HM Government (Beddington, 2013b') which clearly articulates an:

"Emerging trend towards 'hyper-connectivity', where mobile technology and the ubiquity of the Internet enable people to be constantly connected across many different platforms. Hyper-connectivity is already removing any meaningful distinction between online and offline identities, while also blurring 'public' and 'private' identities." (Beddington, 2013b')

⁶See also Section 2.5.1 The technological context

In this context digital culture has formed the basis for on-line consumerism that has generated new models of consumption of the art object in post-physical form. The development of digital downloadable music, literature, games, moving and still image/print has fostered "Remediative*" approaches to the visual relationship between percipient/consumer and the art object and thus "Hypermediacy*" and "Immediacy*" (Bolter and Grusin, 2000') are common and constitute iterations of McLuhan's "Rear-view Mirror" (McLuhan and Fiore, 1967'). Current forms of digital printmaking via electromechanical matrix reflect this and the product of the printmaking act, although using new technologies, is couched in the language of pre-digital printmaking practice 'archival quality', 'limited edition' and 'master printer'. Hovagimyan provides a valuable counter to this:

"... one has to be willing to create art that may not be readily recognized as art-work. It may be helpful to view art making as an on-going process or as aesthetic research. Artists' works are now frequently discussed as their "projects," recognizing the open-ended nature of the artist's aesthetic investigations. When an artist creates a non-traditional work it is often referred to as an "intervention." These two terms represent an intellectual shift away from simple object production and recognize the investigatory nature of creating artwork. The artists may choose to present results of their research to the public at various times when there appears to be a benchmark. The mode of presentation should be appropriate to networked culture" (Hovagimyan, 2001' 453-458).

Thus post-physical practice and forms demand new approaches and new aesthetics for a culture in which mobile technology and the ever-present internet is now blurring virtual and physical realities through augmented reality*. This may be defined as "any case in which an otherwise real environment is 'augmented' by means of virtual (computer graphic) objects" (Milgram and Kishino, 1994'). Philosophically these augmentations involve the layering of virtual information over physical, as a 'layering' process augmented reality can become a natural extension to the 'language of

layering' and, therefore, is the purview of the contemporary fine art printmaker.

In the book *Hard Pressed: 600 years of prints and process*, David Platzker conceived "'post-studio' printmaking in which a new collaboration of art and technology may be melded" (Platzker and Wyckoff, 2000') and he identified it would need to: -

"... provide artists with tools that produce not only engaging art but artworks that are more than simply prints produced by a particular process with an artificial limitation placed on the edition size, since the physical limitations of the medium are limitless ..." (Ibid)

The conditions for both physical and virtual or post-physical printmaking practice are established, when given the blurring between the physical and virtual in terms of our personal identity through social networking and the spaces we inhabit through 'augmented reality'. These conditions are afforded through new modes of distribution and consumption and it is with specific reference to this notion of 'post-physicality' that this research, explores the possible impact of these conditions and mechanisms on contemporary fine art printmaking⁷.

2.3.2 Fluid permanence – reversible process

The concept of permanence in fine art is closely aligned with both economic values and the practicalities of conservation. There are many means, methods and materials used in the production of the work of art in the practice of fine art generally. Achieving longevity, stability and permanence of the art object (and its economic value) is complex and the work of the conservator is specialised and expert. In traditional printmaking there is a

⁷See: - 4.2.2 Research Probe 2 Code as process Explorations of Temporality | 4.2.3 Research Probe 3 The Print as Portal: augmented reality optical/image tracking experiments. | 4.2.4 Research Probe 4 Picture Space: Walking in a Garden of Forking Paths: augmented reality geo-located multiples exploring conceptions of indexicality in digital and virtual space.

predisposition towards making works on paper which “can be damaged by light, extreme or fluctuating temperature and relative humidity, pollution, pests, and poor handling, storage and mounting” (The-Conservation-Register, 2006'). The practical application of 'archival quality' in the selection and use of the materials and processes in the printmaker's practice has become significant. Traditional processes have evolved over time and their means of conservation has developed in consequence.

With the development of new materials, mechanisms and methods there will be an inevitable delay in the development of new means of conservation. This scenario is challenging the established and accepted mechanisms of archiving as against digitally created works of variable nature. Research has examined the relationship between digital print, inks and paper in the context of the fine art printmaker rather than the commercial printer (Hoskins, 2001'). Combined with on-going American research (Wilhelm and Wilhelm, 2002 - onward') establish known parameters for the production of archival digital prints on paper and Laidler's 2011 thesis⁸ is a significant benchmark in this domain.

Digital print however goes further than printing on paper. In Printmaking2.0 there is the opportunity to create works of art through the transfer of artistic expressions from a digital matrix to a secondary surface that is not traditionally based (projected, LCD, plasma and thin film, rather than paper, fabric or wood). Additionally the means of printing may not be traditional and the new physicality of electronic surface instantiation includes e-publication, e-paper, digital surfaces and augmented reality.

The migration of media and processes from one domain (digital processing) to another (the artistic statement) results in new paradigms of which fluid permanence, a reversible process, represents a significant shift from the

⁸ Laidler, P.A. 2011. Collaborative Digital and Wide Format Printing: Methods and Considerations for the Artist and Master Printer. University of the West of England.

paradigm of archival permanence and fixing the image permanently toward meta-data and hyper-mediation.

The digitally mediated print's potential for fluid permanence contrasts with the intended archival permanence of the traditional print. In traditional printmaking the development of the print matrix is essentially a linear and progressive process within the preparation of the printing matrix. By contrast the digital processes inherent in Printmaking2.0 are reversible by nature, when using the new common digital language into which concepts of 'undo', 'history' and 're-coding' fall. This can be illustrated through the work of Philip George who integrated his practice into the digital environment as a "post-studio practice" (George, 2002' 121-127) which questions the concept of the "final or complete" (Ibid); consequential of "digital media's ability to endlessly create hybrid visual mutations existing as digital paintings/prints" (Ibid). George's process reflects concepts of an "infinite palimpsest"⁹ described by Kathryn Reeves who states "printmaking, as an infinite palimpsest, is a material and conceptual surface that stretches across vast spatial and temporal distances" (Reeves, 2001'). Reeves' concept of a palimpsest is still linear and additive. Once the concept is placed in a digital domain the palimpsest becomes multi directional, being additive and reductive, temporal and fluid and physical and post-physical (see Figure 9 below).

⁹ Palimpsest - a manuscript in which old writing has been rubbed out to make room for new, a monumental brass turned over for a new inscription Etymology: Gr palimpsēston, from palin again, and psāein (contracted psēn) to rub. (Chambers)

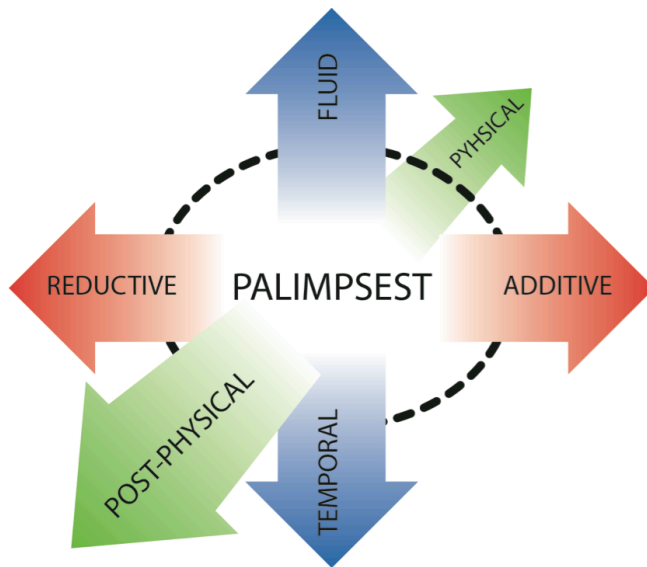


Figure 9: The digital palimpsest.

In this model the artist is able to scroll (conceptually and virtually) from 'the past' (stored materials), through 'the present' (current generative activity) to 'the future' (digital models or propositions of what can be). When digitally stored these complete a fluid loop in which the artist may push and pull at the digital medium, instancing (printing) to physical or virtual materiality according to their artistic judgement (see Figure 10 below).



Figure 10: Printmaking 2.0 temporal (fluid) loop

The act of printmaking is located within the context of time when the art object as “presented through an online medium shifts from the physical to the temporal” (Corcoran, 1996' 375-378). In this context the artist has the potential to engage and re-engage with the print matrix ‘ad-infinitum’, providing a condition of ‘fluid permanence’. Each engagement constitutes an instance*, which as Drucker identifies “is the manifestation into substance, the instantiation of form into matter that allows something, anything, to be available to sentience” (Ibid). The concept assumes particular significance in the digitally transferred image when at the most basic level “no two pixels are alike and that the instantiation always bears in its material embodiment the specificity that makes for difference from the (digital) code” (Drucker, 2001' 141-145). This is another example of fluid permanence. Permanence which may be further refined as fluid and proportional to the art object’s temporal permanence set against its potential for variable but repeatable instancing (printing).

2.3.3 Beyond signature

The “Code of ethics for original printmaking”(Malenfant and Ste-Marie, 2000') identifies a paradox in printmaking, whereby the original work only begins to exist when the first copy is pulled. In this context the ‘Code’ then defines mechanisms of signifying the ‘original print’:

“Original prints are signed by the artist and numbered according to the identification rules for editioning...” ...“Standard procedure is to identify proofs on the front in pencil, below the image or at the bottom of the support, and that such identification include type of proof, numbering, title, artist's signature and that of the interpreter where appropriate, and date of printing.”(Malenfant and Ste-Marie, 2000')

These standard rules of signature are a relatively new and western notion. Daniels observes “until the Middle Ages, pictures were seldom identified with their makers and it was only in the course of the Renaissance that signing works of art became an established means of indicating authorship” (Daniels, 1996'). Daniels also identifies that “signature assumed a particular importance in printmaking, partly as a result of the division of labour which

soon arose between the artist, the engraver, the printer and the publisher.” (Ibid) The need for signature came during the exponential growth in the distribution of visual art as a result of mechanised printmaking. It is now accepted that, just as the development of mechanised printing processes accelerated the rate of information exchange, so the development of digital mediation has had a similar if not greater effect in visual art. In art practice the signature has assumed significant status becoming “cultic” (Benjamin, 1936') and, as illustrated by Duchamp, through appropriation and signature of the “readymade”. In the book “Unpacking Duchamp” Judovitz defines Duchamp’s “Fountain” and its subsequent reproduction as “an original that is a documented copy (which) leads to the proliferation of copies that are now documented originals” (Judovitz, 1995'). In essence this conforms to the Malenfant and Ste-Marie’s “originality paradox” in which we see “the reproduction of a copy in order to produce legitimate art objects” (Judovitz, 1995') conceiving the “creative act in economic terms” (Ibid) in which economic value is “apportioned to the reproduction of the object” (Ibid) and defers “the concept of originality by ascribing value not to the object itself but rather to its circulation” (Ibid).

Where ‘digital’ is part of a printmaking process that results in printing to a physical surface, accepted norms of signature and editioning will continue to suffice. However in digital and de-materialised mechanisms the signature, which is easily copied or cloned, is no longer singular as a mechanism of originality or authenticity. Daniels argues: -

“The validity of the connection between script, name, hand and individual is contingent on two aspects: not only on the act of signing, which is performed in an instant, but also on the assumed existence of a stable and durable link between content and medium. In the digital world, where everything is continually reversible, it is impossible to pin down a fleeting physical gesture in this way and give it the permanence of a material object.” (Daniels, 1996')

Therefore new paradigms, which go beyond signature, are required for identification and authorisation of digitally mediated print art objects. Paradigms are to be found in post 9/11 security technologies, concepts of

"signature from its digital origination" (Fitzheugh, 2010a') and embedded meta-data. This can be illustrated by Sterling's concept of the 'Spime' which are objects so constituent of extensive informational support they are "material instantiations of an immaterial system" (Sterling, 2005') and thus the body of information extends ideas of signature into the digital provenance. This is at variance to the economic model of the limited edition fine art print where the allocation, production and distribution of the work is controlled by the gallery/publisher. Naughton argues in "From Guttenberg to Zuckerberg" second generation creativity [Creativity 2.0] (Naughton, 2012b')] that a "push-media-dominated ecosystem" (Ibid) has shifted to one based on user content generated through the internet. This reflects a similar transition from gallery/publisher model, also a "push media* ecosystem", to user driven virtual print atelier¹⁰.

2.3.4 Summary of section: materiality and signature in post-studio practice

This review seeks to pinpoint the clear difference in materiality between traditional and digitally mediated printmaking practice (Printmaking2.0). Traditional views of art prescribe a relationship between medium, materiality and genre which, with the advent of postmodernism, has become increasingly eroded (Buskirk, 2003'). When set against postmodern concepts of the art object, digital printmaking evokes different types of 'Aura' and forms of materiality through the closer relationship with Barfield's conception of 'transmissible art'. New materiality in digital 2 Dimensional and 3 Dimensional printing and a new physicality with electronic surfaces and augmented reality is afforded through new modes of distribution and consumption via ubiquitous "hyper-connectivity" (Beddington, 2013b') and notions of 'post-physicality'. In this context artists have access to digital tools that are now commonplace and have established a common language of practice, a view supported by Naughton who identifies that:

¹⁰See Public Output - Paper - Social Networking and Affinity Spaces
(<http://www.atiner.gr/papers/ART2012-0076.pdf>) or accompanying Data CD.

"In the last decade the computing industry has democratized access to powerful software tools for creating, editing and manipulating digital content, and the Internet has provided ordinary people with ways of publishing what people produce with those tools."(Naughton, 2012b')

This provides the technology for the development of a second generation of printmaking, Printmaking2.0, which meets notions of 'post-studio' and 'post-physical' practice (George, 2002' 121-127) through hyper-connected ubiquitous socially networked media, as described by Beddington. These demand new approaches and new aesthetics which will require an "intellectual shift away from simple object production" (Hovagimyan, 2001' 453-458) and recognition of the intellectual processes inherent in a paradigm shift of fluid permanence and reversible process.

Concepts of permanence in fine art printmaking have been closely aligned with both fiscal values and the practicalities of conservation. The development and mainstreaming of digital printmaking through an electromechanical matrix, such as archival inkjet printing, lies in physical space and often espouses traditional concepts of the published limited edition. Printmaking2.0 is resident in digital space (as conceived by Kilian) these digitally mediated works of a variable nature, challenge established and accepted mechanisms of archival. New concepts of physicality via electronic instantiation means including: e-publication, e-paper and temporal augmented reality, in which the potential for engaging and re-engaging with the art object provides a condition of fluid permanence.

Concepts of fluid permanence include those of reversible process. The development of the print matrix is essentially linear and fixed in traditional printmaking, whereas the digital processes in Printmaking 2.0 are, by nature of the medium, reversible through digital code. The digital medium can be scrolled from the past (stored materials), through the present (current generative activity) and into the future (digital models' propositions of what can be). When digitally stored these complete a fluid loop in which the artist and the audience may participate in "remix culture"(Manovich,

2005b') pushing and pulling at the digital medium, printing to digital materiality as informed by their own aesthetic reasoning.

This digital materiality and fluidity raises fundamental questions of signature, which was traditionally a consequence of the distribution of visual art through mechanised printmaking. Signature has assumed significant almost 'cultic' status in traditional printmaking practice as reflected in "The code of conduct for original printmaking" . This raises the challenge to find new paradigms which go beyond signature and may include meta-data, security technologies and signature of process for identification and authorisation of the digitally mediated print art object.

2.4 Modes of consumption

The production and consumption of mass cultural products may be musical, textual, visual or filmic and continue to develop significantly through mass digital participation via pervasive digital systems. For example Gere in his 2004 paper: New Media Art and the Gallery in the Digital Age states: -

“Nowadays most forms of mass media, television, recorded music and film are produced and even distributed digitally; and these media are beginning to converge with digital forms, such as the Internet, the World Wide Web, and video games, to produce a seamless digital mediascape.” (Gere, 2004')

In the period since 2004 there has been no indication of decline in this process and market data figures such as Deloitte&Touche LLP's A Quarterly Index (www.deloittedigitalindex.com) which “quantifies the rate of change of twelve (digital) technologies, media and telecommunications products and services” (Deloitte&Touche, 2009') provide evidence of continued growth in sales of digital devices. Ofcom's sixth International Communications Market report identified that “despite the economic downturn, global communication revenues continue to grow” (OFCOM, 2011'), whilst “eight in ten UK internet users (79%) said they had ordered goods or services online” (Ibid). Therefore within the context of digital mediation and distribution the modes of consumption; exhibition (curation*), exchange (collaboration) and sale (on-line marketplace) applicable to digitally mediated print art should be considered.

2.4.1 Curating the digital

Examination of the curation and exhibition of digitally generated and/or mediated art (including print art forms) reveals a series of key exhibitions/curatorial practice, academic research/publication and philosophical discourse.

Since the late 1950s there have been a series of key survey exhibitions of art made through the digital medium beginning with Experimentelle Ästhetik - Museum of Applied Arts Vienna (1959) through to Decode: Digital Design Sensations - The Victoria & Albert Museum London (2009/10) (see Figure 11).

Year	Exhibition
1959	Experimentelle Ästhetik, Museum of Applied Arts Vienna
1968	Cybernetic Serendipity, ICA London
1988	Electronic Print Arnolfini Gallery Bristol ¹¹
2001	010101 Art in Technological Times, SFMOMA
2009/10	Decode: Digital Design Sensations and Digital Pioneers, The V&A London

Figure 11 Key Digital Exhibitions 1959 – 2010

These exhibitions may be viewed equally as establishment recognition of the digital medium in the artistic context and they are survey exhibitions, which witness a greater and largely unseen curatorial consideration of the digital. These exhibitions may be considered the tip of the iceberg, but their significance lies in the indication of an increasing groundswell of curatorial activity. Of common significance is the curators' endeavour to contextualise the emergent art-form through the traditional gallery setting. These exhibitions establish and validate paradigms of curating the digital which are researched academically in the later part of this period (since the 1990s).

¹¹The Electronic Print Exhibition (1989), curated by Martin Reiser at the Arnolfini Gallery, Bristol signifies a tipping point in acceptance of electronic printmaking and (as identified by Gollifer) precursors: "ArCade I (1995), the first International Exhibition of Electronic Fine Art Prints and subsequently ArCade(s) - II (1998), III (2001) and IV (2003)"

Public availability of the internet and the emergence of an interactive digital medium through personal computing in the 1990s coincided with the emergence of research that critically examined the potential of the digital medium for curation and presentation of digitally mediated art. R.J. Whall's 1996 doctoral thesis: "Documentum de transmutatio: rhizomatous modelling in hypertext for the digital reformation and extension of gallery circumscribed art-installation" which:

"demonstrated perceptibly and theoretically that it is practically feasible to digitally recast a delimited gallery-object in the dematerialised environment of hypertext (HyperCard 2.0v2), without forfeiting the determinate meaning of that notional carrier" (Whall, 1996')

This provided an essential foundation to the validity of the de-materialised art object in a non-gallery context. Whilst the public exhibition of Hockney's 'Fax Prints'¹² provided an electronic exemplar of instantiations over time and distance via electronic means within the studio/gallery context.

Concurrent with the work of Whall and published in 1997, C.E.B. Graham's Thesis (PhD University of Sunderland) "A Study of Audience Relationships with Interactive Computer-Based Visual Artworks in Gallery Settings, through Observation, Art Practice, and Curation" examined "contemporary interactive computer-based artworks ... with particular reference to the problems and opportunities presented by their relationship to their audience in conventional gallery settings" (Graham, 1997'). It provides an early but significant analysis of the methods, mechanisms and context of curating digitally mediated work. This research is a precursor to "Curating New Media" (Cook et al., 2002') and its subsequent series of sister publications, a transcript of proceedings at the third Baltic International Seminar in 2001.

¹²"For six months Hockney sent images around the world under the title of The Hollywood Sea Picture Supply Co. Est 1988." HOCKNEYPICURES.COM. 2004. *David Hockney (About-Chronology)* [Online]. UK: HIP Design. Available: http://www.hockneypictures.com/illust_chronology/illust_chrono_07.php [Accessed 4th April 2013].

Inherent in the discourse are debates on the relationship of new practices in traditional gallery structures.

The debate is polarised between Vuc Cosic who states: "in my view, when you show online stuff in a gallery space, which is not online, you essentially put it in the wrong place. It's not at home. It's de-contextualised; it's shown in a glass test-tube." (in Cook et al., 2002') and Thomson & Craighead: "there are some pieces that we just do on our website because that's an interesting area to work in. So for us, we're very happy to be shown in galleries." (Ibid)

This discourse continues to be significant in the curation of the digital medium as indicated by K.A. Verschooren's doctoral thesis ".art : situating Internet art in the traditional institution for contemporary art" (Verschooren, 2007'). The view offered by Thomson & Craighead provides an indication of similar practices explored by Muller & Edmonds (2006) who contend that:

"The curation of interactive art (computer based art) has still not progressed largely beyond the traditions of museology. They describe the work of Beta Space a "living laboratory" which, through practice-based research examines interactive art, curatorial practice and audience research" (Muller and Edmonds, 2006' pp 147-150).

This provides a valuable model in the development of 'proto-gallery' space, designed to respond to the need of digital art including the digitally mediated print. Online curation and exhibition is becoming a significant context for the digitally mediated artwork, as indicated by the Digital Art Museum¹³ and the Los Angeles Centre For Digital Art¹⁴ with their physical and online manifestations. These contexts are beginning to exhibit the criteria associated with the 'future objects' "Spimes" proposed by Sterling (see Table 3 p.72) where print objects could be digitally mediated art objects, curated and conserved via established international multimodal-networked systems. These systems could be adjunct to major art museums, universities or creative commons repositories, capable of facilitating digital

¹³<http://dam.org/dox/2282.9RhSN.H.1.De.php>

¹⁴<http://www.lacda.com/>

instantiation and re-instantiation. A potential illustrated by the contemporary manifestation of 'The Thing'. Established by Wolfgang Staehle in 1991; 'The Thing' was a bulletin board system predating the WWW and Netscape: "itself was an artwork in the form of a Beuysian social structure" (Platzker and Wyckoff, 2000'). A highpoint "of the early editions was Peter Halley's "Superdream Mutation" (1993), a digital version of his signature paintings done as an unlimited and unsigned edition for The Thing, one of the first digital prints by a well-known artist" (Ehrenfried, 2009'). 'The Thing' is now a not for profit organisation/network (<http://thing.net/>) which holds the right to edition digital print art from the artists it represents¹⁵ through <http://editions.thing.net>.

Current (2013) AHRC funded post-doctoral research by Nora O. Murchú features an open call exhibition Economics & The Immaterial' which aims to answer questions as to:

"How do we give value to immaterial goods? How are digital images bought and sold? What is the relationship between economics and digital aesthetics? How can curators and artists create new platforms and models for the creation of economic exchange?" (OMurchú, 2013').

Thus we see a spectrum of activity from public curation to the almost commercial, which in the latter case is discussed more fully section 2.4.3 The on-line marketplace – selling in a non-material world p.58. The notion of print objects capable of instantiation and re-instantiation; being digitally mediated, curated and conserved via multimodal-networked systems is explored through the curation of 'Born Digital – New Materialities' digital print exchange, the practice-led Research Probe 1 designed to study this concept (see sections 3.4.1 [p119] and 4.2.1 [p.152]).















¹⁵0100101110101101.org, Granat/Mosset, Jan Baracz, Christoph Draeger, Peter Fend, Rainer Ganahl, Noritoshi Hirakawa, Simone Huelser, Joerg Lohse, Wolfgang Staehle, Caspar Stracke, and Beat Streuli

2.4.2 Networked collaborations – the digital atelier

The researcher's previous work in social networks relating to the printmaking community led to a participatory study of these networked collaborations. The examination of the effects of digital participation through Web2.0, online networking and social media on collaboration (as well as distribution and consumption) in contemporary printmaking practice, is a key area of study in this research as identified in the Topoi of Review (section 2.1 p.19). It is the subject of a published and peer reviewed paper "Social Networking and Affinity Spaces - The Virtual Atelier" (Pengelly and Thompson, 2012')¹⁶

The emergence and adoption of Social Networking since the turn of the century reflects a maturing 'digital culture' defined by Deuze (Deuze, 2006' 63-75) and greater 'connectiveness' between producers and consumers of cultural behaviours (Bolter and Grusin, 2000'). They provide clear indicators in communities of digital adoption and new e-cultural modes of engagement. Adoption continues at a significant rate as illustrated in Table 1 (below), which reveals an estimated 1,941,000,000 new visitors during February 2013 (a 569,600,000 increase on 1,371,400,000 for the same period 12 months earlier).

¹⁶Presented at the 3rd Annual International Conference on Visual and Performing Arts. Athens: Athens Institute for Education and Research (ATINER).

	1 Facebook	750,000,000	Established 2004
	2 Twitter	250,000,000	Established 2006
	3 LinkedIn	110,000,000	Established 2003
	4 Pinterest	85,500,000	Established 2010
	5 MySpace	70,500,000	Established 2003
	6 Google Plus+	65,000,000	Established 2011
	7 DeviantArt	25,500,000	Established 2000
	8 LiveJournal	20,500,000	Established 1999
	9 Tagged	19,500,000	Established 2004
	10 Orkut	17,500,000	Established 2004
	12 Ning	12,000,000	Established 2005
	13 Meetup	7,500,000	Established 2001
	14 myLife	5,400,000	Established 2002
	15 Multiply	4,000,000	Established 2003
Total		1,941,000,000	

Estimated unique monthly visitors Source - eBizMBA.com, eBusiness knowledgebase 12/02/2013

Table 1: Top 15 Social Networking sites by number of visitors

Adoption of these Networks reflects the conditions described by Deuze for the indication of digital culture and Julia Davies examined these conditions further in her 2006 paper "Affinities and Beyond! Developing Ways of Seeing in Online Spaces" (Davies, 2006' 217 - 234). In the context of the social media network 'Flickr' Davies identifies that such a network forms an "affinity space" as defined by Gee (2004) and comprising:

- There is a common endeavour (interests, goals or practices).
- The space has content.

- The content is organised.
- Individuals can choose to interact with content and/or each other.
- Individuals share the same space, even if fulfilling different roles.
- There are many ways (portals) of entering the space.
- New content can be generated.
- Many types of knowledge (individual, distributed, dispersed and tacit) are valued.
- Group endeavour is valued and encouraged.
- Interactivity is required to sustain the affinity space.
- Novices and the experienced occupy the same domain; there is no segregation.
- There are many ways of participating and these can change temporally.
- Leadership is 'porous'.
- There are many ways of gaining status.
- The organisation of the space can change through interaction.

Developments in social networking and affinity spaces have promoted new forms of collaboration and participation. These developments have seen the creation and promotion of new affinity groupings, traditional and existing; established groups, including printmakers, have also readily adopted such mechanisms. The shifts between 2010 and 2012 may represent both transitions from 'early adopters' to the 'early majority' and an evolutionary cycle of growth and decline in the groups themselves.

Table 2 List of Printmaking Related Social/Affinity Spaces p.56 indicates the range of printmaking related groups and social media sites. The sample is composed of 21 groups with over 24,000 members between them. Clearly the potential for multiple memberships exists, however in general this is a substantial indicator as to the increasing importance of these affinity groups in the printmaking practice.

Name of Group	url	Membership 2010	Membership 2012		Network
Inkteraction	http://inkteraction.ning.com/	4,202	6,036	+43%	Ning.com social network sites
Print Universe	http://printuniverse.ning.com/	223	982	+340%	
Artist Books 3.0	http://artistbooks.ning.com/	1330	2,383	+79%	
New Hampshire Art Association	http://nhartassociation.ning.com/	229	Deleted	n/a	
Western Avenue Studios Artists Association	http://wasaaorg.ning.com/	162	Deleted	n/a	
Printmaking	http://www.flickr.com/groups/printmaking/	2,254	3,202	+42%	Flickr
Digital Fine Art Printing	http://www.flickr.com/groups/52134614@N00/	360	386	+7%	
Art Directory	http://www.flickr.com/groups/artdirectory/	7,288	12,129	+66%	
Screenprinting	http://www.flickr.com/groups/screenprinting/	1,834	2,382	+29%	
Block Prints	http://www.flickr.com/groups/block-prints/	1,084	1,559	+43%	
I LOVE LITHO - - - and most other forms of printmaking	http://www.facebook.com/group.php?gid=6041889943	446	4	n/a	Facebook groups
Book Art, Artists Books and Book Artists	http://www.facebook.com/group.php?gid=2458264065	1,859	8	n/a	
Printmakers Rock!..Oh yes they do!	http://www.facebook.com/group.php?gid=2297074577	339	1	n/a	
I Love Printmaking	http://www.facebook.com/group.php?gid=2259500527	1781	8	n/a	
I'm not OC, I'm a printmaker.	http://www.facebook.com/group.php?gid=2212695085	198	1	n/a	
Printmaking presses and equipment	http://www.facebook.com/group.php?gid=121864389055	437	4	n/a	Facebook groups
Friends of Baren Forum for Woodblock Printmaking	http://www.facebook.com/group.php?gid=121864389055	243	486	+100%	
Meet Your Printmaker	http://blog.meetyourprintmaker.com/	n/a			
NontoxicPrint.com - Nontoxic Printmaking	http://www.nontoxicprint.com/	n/a			Blogs & forums
New directions in printmaking	http://homepage.usask.ca/~nis715/	n/a			

Table 2 List of Printmaking Related Social/Affinity Spaces

Examining the spaces undertaken through participant observation in an ethnographic style of research, as defined by Bryman in "Social Research Methods 3rdEd." (Bryman, 2008') The targeted sample of social networks were considered, reflected on and analysed from a relativist stance using a hermeneutic, dialectic methodology (see also section 3.0 Methodology and

Data Gathering). Analysis of the printmaker's networks, identified in Table 2 above, reveals new models of printmaking collaboration (which traditionally focussed on the relationship between artist, printmaker and publisher (Ashe, 2001')). The conditions for Deuze's digital culture and Davies' Affinity Spaces may be apparent and there may be sufficient evidence that new digitally mediated forms of co-working and collaboration exist.

These networks may be viewed collectively as:

"a 'Virtual Atelier', in which, like the working practices established by S.W. Hayter's 'Atelier 17' artists work in a connected way sharing their ideas, discoveries and achievements, but now through internet based digital networks, at a variety of levels of engagement from direct person to person / proximity based to expanded 'digital neighbourhoods' of connectedness. Naturally adopting artistic collaboration over time and distance engendered through de-materialised or networked collaborative practices." (Pengelly and Thompson, 2012')

2.4.3 The on-line marketplace – selling in a non-material world

The emergence and development of e-commerce and the online marketplace during the first decade of the 21st century is one of the most significant developments in both commerce and digital participation. A simple example of its importance was illustrated in “the non-seasonally adjusted average weekly value of internet retail sales in February 2010” of “£414 million, which was approximately 8.0% of total retail sales (excluding automotive fuel)” source - statistics.gov.uk¹⁷. Despite the current economic depression, this area continues to grow with “online retail sales increased by 14% last year to more than £50bn” (The-Guardian, 2012') and a similar increase for 2012 predicted.

Buying online has progressed beyond “Innovators” (Rogers, 2003') and the “Early Adopters” (Ibid) and is now common amongst the “Early Majority” (Ibid). The online marketplace forms a significant part of contemporary life and now provides an established e-commerce medium for direct sales by galleries, co-operatives and individual printmakers.

Review of online activity in traditional printmaking reveals, amongst commercial galleries, studios and publishers, the existence of online sales and promotion sites where full details of prints available, artists, medium, edition number and price are available. In addition there are ‘agency sites’ which offer a variety of such sources, of which originalprints.com is an example, see Figure 12 (below). Within this context ‘Sales through agency’ show commodification of artistic products in the same way as other products readily available through online sales.

¹⁷ <http://www.statistics.gov.uk/pdfdir/rs0310.pdf>

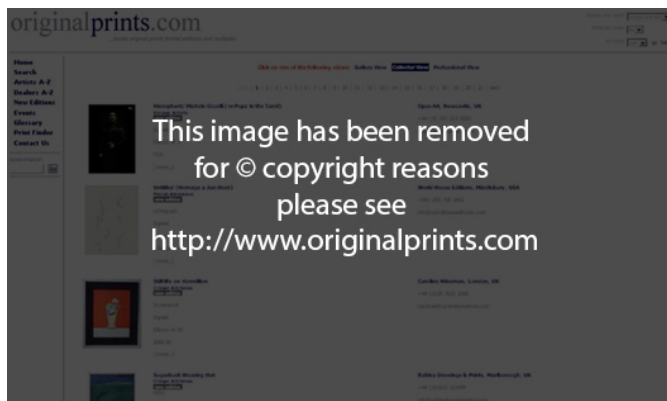


Figure 12: www.originalprints.com

Perhaps one of the most significant features of the growth of the online market are the direct sales by artists themselves and 'Etsy' (see Figure 13) is the most established. Essentially an eBay for the hand-crafted, the site works by direct sales and commission rather than auction and carries functions and structures reminiscent of social media sites such as 'Flickr'. The Etsy site has numerous categories from art to woodworking, including a dedicated section for printmaking, with over 700 prints on offer at the time of review.



Figure 13: www.etsy.com - printmaking

Both these examples are standard e-commerce approaches to online sales - providing either sales links, or direct sales of print art via an agency/financial commission model. Counter to these commercial structures there are artist co-operatives such as 'Justseeds'¹⁸ see Figure 14, a selling collaborative who describe themselves as:

¹⁸<http://www.justseeds.org>

"Justseeds Artists Cooperative is a decentralized network of 24 artists committed to making print and design work that reflects a radical social, environmental, and political stance. With members working from the U.S., Canada, and Mexico, Justseeds operates both as a unified collaboration of similarly minded printmakers and as a loose collection of creative individuals with unique viewpoints and working methods. We believe in the transformative power of personal expression in concert with collective action. To this end, we produce collective portfolios, contribute graphics to grassroots struggles for justice, work collaboratively both in- and outside the co-op, build large sculptural installations in galleries, and wheatpaste on the streets – all while offering each other daily support as allies and friends".(Justseeds, 2012')

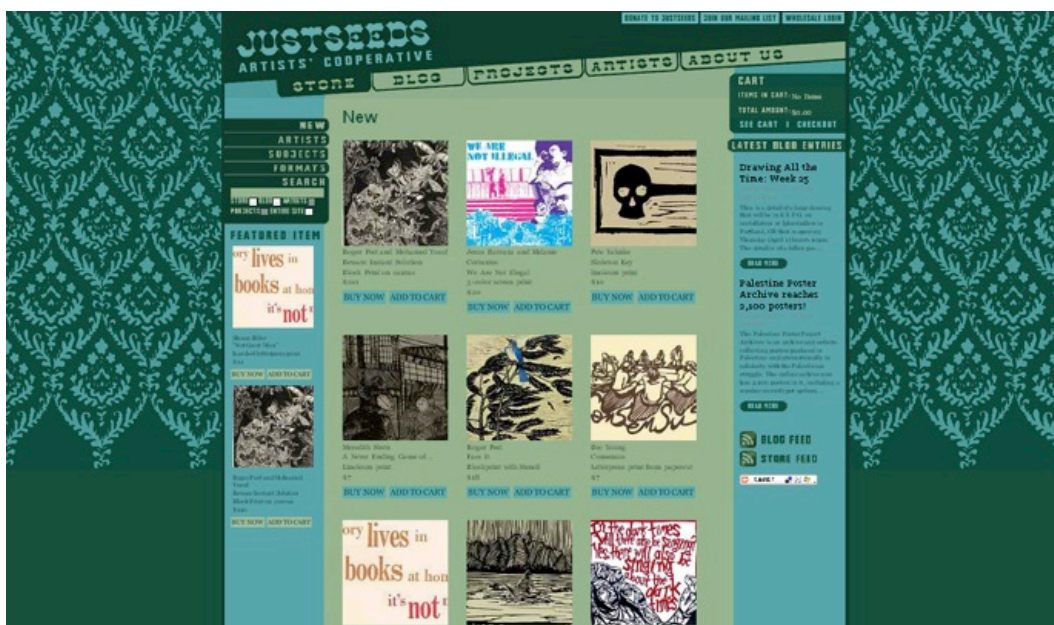


Figure 14: Screen shot from 'Justseeds' website

So there is an established and growing online marketplace for traditional printmaking, with recognised structures and robust e-commerce mechanisms beginning to shift the locus of commercial activity. In this context Annis Fitzheugh of Dundee Contemporary Arts Print Studio commented (during an interview undertaken for this research):

"I wonder if there is a feedback from the Internet that artists are going to find certain images sell better because they reproduce better,

therefore they're going to make art that reproduces better on the Internet" (Fitzheugh, 2010b').

As well as the development of the online market for traditional print art, there are important developments in 'print on demand' technologies in the publication and sale of literature and printed media¹⁹ that will in due course influence the practice of Printmaking2.0.

Online markets for the publication and purchase of music have now become mainstream, as demonstrated when in 2009 Apple's iTunes became dominant in the US market (as reported by Jackie Cheng, 2009'), with iTunes selling 25% of all music in the US (including sales of CDs and other media). "When looking at only online sales, iTunes made up 69% of the digital music market in the first half of 2009 and Amazon MP3 came in second at 8%". (Cheng, 2009'). Cheng quotes Russ Crupnick (an industry analyst) who stated: "with digital music sales growing at 15-20% and CDs falling by an equal proportion, digital music sales will nearly equal CD sales by the end of 2010". The music sales model developed by Apple, which has evolved workable mechanisms for commercial protection of the distributed media, has demonstrated the profit potential of electronic distribution; with its direct sales model and reduced overheads consequent of not having to press discs and ship physical products.

It is this model that Amazon and others have developed for e-publication. After promoting their e-book reader the 'Kindle', Amazon is currently at the cutting edge of commercial development of electronically published literature. Media-Post Publication's Mark Walsh, reported "Driven by Amazon's popular Kindle device, e-book sales worldwide will jump from \$323 million in 2008 to nearly \$9 billion in 2013, according to a new In-Stat forecast. E-book (reader) shipments, meanwhile, will soar from under 1 million to almost 29 million in the next five years" (Walsh, 2009'). These

¹⁹Print on Demand discussed as part of BODMAN, S. & SOWDEN, T. 2010. A Manifesto for the Book. Bristol: Impact Press.

predictions gain credence from wholesale e-book sales statistics 2002–2009 inclusive, as illustrated in Figure 15 (below):

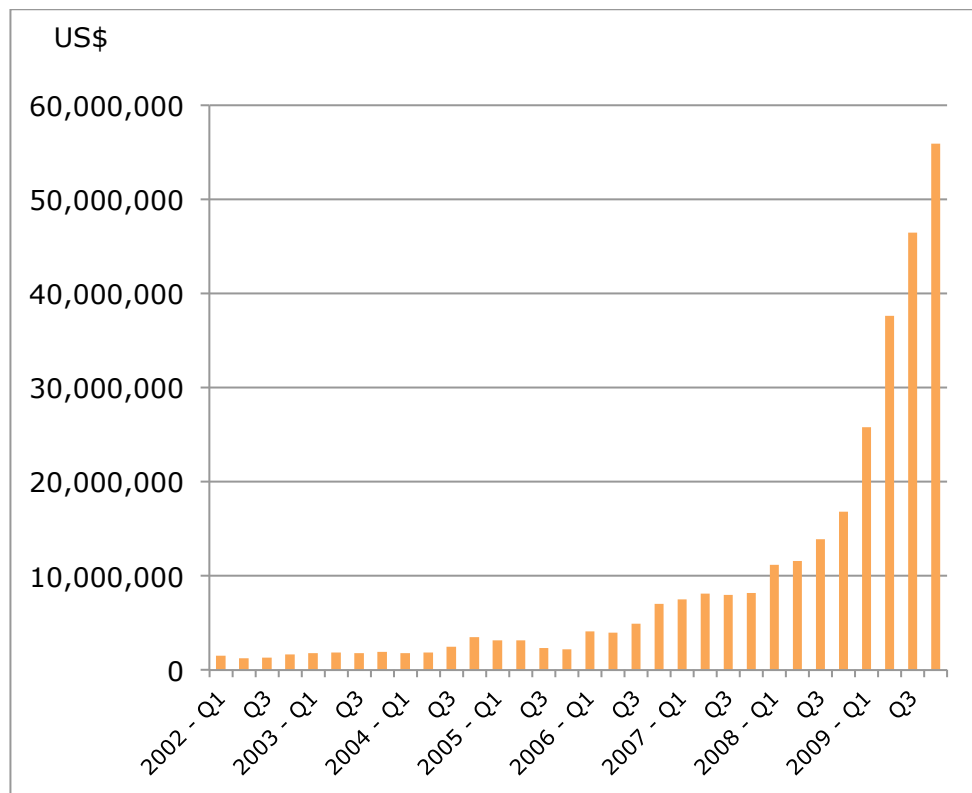


Figure 15: Wholesale eBook sales statistics (US) (data source - openbook.org, 2009')

These processes represent new models of cultural consumerism and new concepts of materiality and connoisseurship alongside the technological developments drawn from the commercial print and publishing industries. The development of e-publication and sales of music and literature presents an interesting context against which Printmaking2.0 is set. These business models sell post-physical merchandise in a post-physical market. Such developments are highly significant to artistic printmaking practice as increasingly they will influence digital mediation in artistic practice and the e-publication of the digital fine art print (Printmaking2.0). Perhaps of greater significance is the potential for direct dialogue between artist and audience/market through personal publication.

2.4.4 Summary of section: modes of consumption

The series of survey exhibitions of art form, made through the digital medium since the late 1950s have been both establishment recognition of the digital medium in the artistic context and a reflection of the greater recognition of curatorial consideration of the digital medium. The significance of these exhibitions is their indicator as an increasing groundswell of the digital medium in curatorial activity and paradigms for curating digital printmaking. A context which lead the researcher to develop a 'Research Probe' (see Section 3.4.1 Research Probe 1: "born digital – new materialities" digital print exchange) which directly examines curating digitally mediated printmaking practice via social networks and affinity spaces then conserving the works in digital repositories adjunct to art museums, universities or creative common repositories.

Developments in social networking and affinity spaces have promoted new forms of collaboration and participation, creating and promoting new affinity groups in the printmaking community. Networks which as discussed here and in "Social Networking and Affinity Spaces - The Virtual Atelier" (Pengelly and Thompson, 2012') further emphasise the unique position of the printmaker/artist in new models of post-physical practice. With the developments in curation of digital art-forms and socially mediated collaborative practice, the establishment and growth of the online marketplace now forms a significant commercial environment for contemporary living. Some printmakers and organisations are embracing online selling as a medium for direct sales. Online markets offer entirely new forms of cultural consumerism, affording the print artist new concepts of materiality and connoisseurship, although it has been suggested that the greater visual effectiveness of certain print forms and styles when seen on a screen may affect the aesthetic and commercial judgments of artists. While the production and consumption of cultural products continue to undergo significant changes through the adoption and application of mass digital participation via ubiquitous and pervasive digital systems.

2.5 Emergent forms

Emergent or 'new forms' as identified in Figure 2: The Topoi of Review (p.20) are the product of 'innovators' and 'early adopters'. Rogers describes innovators as "Brave people, pulling the change". Adapting Roger's model in the context of art practice would see innovators as: the avant-garde and cutting edge artists who develop new forms. 'Early adopters' are "respectable people, opinion leaders who try out new ideas, but in a careful way" (Rogers, 2003'). Typical early adopters within contemporary digitally mediated art practice are seen as leaders in the development and delivery of sustained projects (artistic, academic or commercial) applying innovation in new ways. Developments in this field are a product of "mathematics, engineering, computer science and industry, as well as the fine and applied arts" and "its history is a shared one" (Bedard, 2009'). The field, as Bedard also identifies "has widened with more artists working with digital technologies in increasingly open and interchangeable ways". Kushner tells us:

"New technology demands new parameters of definition and a print does not need a fixed matrix nor does it need to be a piece of paper physically pressed against a template. Indeed, in this new technology often no machine even touches the surface of a print²⁰. This is a multiply produced object made with a new type of template and printed on another material-often paper but not always so." (Kushner, 2009')

This reflects Pengelly's position which identified that: "computer-manipulated printmaking offers the possibility of generating radically new physical, aesthetic and conceptual frameworks within the medium" and questioned: "to what extent the printed artwork's visual form and meaning, can be a function of 2-dimensional visual evidence? When physically and

²⁰As illustrated by "Typo-Topography of Marcel Duchamp's Large Glass" - Richard Hamilton Bristol: CFPR - UWE 2004.

conceptually digital printing has removed any distinction between 2-dimensional and 3-dimensional means of production" (Pengelly, 2001'). Traditional ideas in printmaking practice, which separate visual and physical representation, have been eroded along with separations between representation and instantiation. Consequently the emergence of digitally mediated works that are "printed" in 2 or 3 dimensions from a 'digital matrix' has been increasingly apparent, as illustrated by Figure 16 to Figure 23 (below).



Figure 16: digital (multi-pen) plotter drawing "Cyberflower, Sunshine1"
(Verotsko, 2008' Multi-pen plotter drawing (Collection V&A))

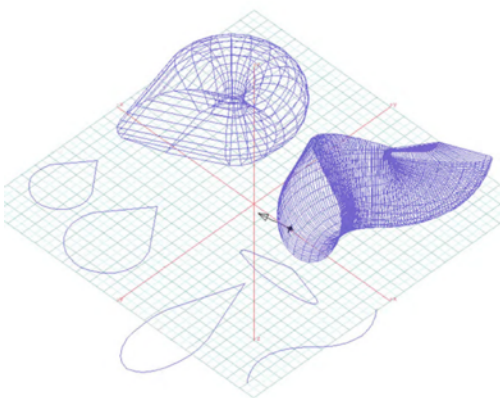


Figure 17: Digital Diagrams for "Serpents and Snails", 2000, FormZ digital image (Gernand, 2000-2001')



Figure 18: Installation view of "Serpents and Snails", 2001, Ceramic made at European Ceramics Work Centre (EKWC), Holland



Figure 19: Still from "Biogenesis" (Latham, 1993')



Figure 20: Digital print "The Marriage"(Hamilton, 1998' Digital print on paper)



Figure 21: Glasswork "Flight Landing" (Mann, 2005')



Figure 22: "Between the two" 2 x double sided hand cut inkjet print, steel pins 103cm x 10m x 1mm (Guy-Robinson, 2004' 2 x double sided hand cut inkjet print, steel pins Printed on Fuji photographic, 290gsm)



Figure 23 3D Print "Manta Ray" (Reid, 2010' Z Corp Powder Based 3d Print)

Each of these examples illustrates the diverse and shifting context of these emergent forms derived of digital tools and processes. Although the work

remains in the digital context, a blurring exists between the once traditional separations of 2 and 3 dimensional practices. There is also a blurring between physical and digital space through 'augmented reality'.

A matrix can now be conceived enabling new concepts in 'digital layering'. A concept which has enabled new forms of informational access and metadata publication and should be contextualised against the advent of Web2.0 and ubiquitous pervasive computer networks, (for example virtual print realised through geo-tagging, Google Maps & Layers and Flickr Maps). New meta-layers* may be applied to the digitally mediated print form, in addition to the physical or virtual print object. These new meta-layers further place Printmaking2.0 objects in the "radically new physical, aesthetic and conceptual frameworks" suggested by Pengelly and form the new areas of practice this research examines through the practice of Printmaking2.0.

The emergence of new and adapted forms of practice across the range of creative arts practices suggest that digital technologies can now foster certain commonalities between disciplines. This leads to the establishment of a 'digital lingua franca' from trans-disciplinary practice, as explored in "An Exploration of Hybrid Art and Design Practice Using Computer Based Design and Fabrication Tools" (Marshall, 2008'). This is not merely the adoption of common digital tools (for example Adobe Photoshop) but, as Naughton suggests, "at the most general level, digital technology makes it possible to do old things differently (and maybe better) and to do new things that were hitherto impossible" (Naughton, 2012a'). By considering this and analysing Naughton's concept that computers are "perfect copying machines" (Ibid), more significant similarities in digital printmaking practice are established when compared with its analogue counterpoints (see Figure 24 below).

This model applies across the range of creative practices using multiple, edition-able and transmissible forms whether visual, musical or literary and the products of this practice are no longer bound in two dimensions or even physical space. These 'cultural artifacts' meet Sterling's conception of a "Spime" (Sterling, 2005') accompanied by "constituent informational support" (Ibid) or meta-data. This establishes them as a second generation

of practice, in which the transference from originator to audience is no longer one directional but becomes a socially mediated dialogue in which the separation of the artist and audience becomes blurred²¹.

	EXPERT	SPECIAL EQUIPMENT & MATERIALS	THE ORIGINAL WEARS & DEGENERATES	REQUIRES PHYSICAL DISTRIBUTION
ANALOGUE PRACTICE	DIFFICULT	EXPENSIVE	DEGENERATIVE	DIFFICULT TO DISSEMINATE
	↕	↕	↕	↕
DIGITAL PRACTICE	AFFORDED	INEXPENSIVE	NO DEGRADATION	EASY TO DISSEMINATE
	CITIZEN PRACTITIONER	READILY AVAILABLE MASS PRODUCED DIGITAL TECHNOLOGY	EACH COPY IS PERFECT	NETWORKED COMMUNICATIONS INTERNET

Figure 24: Comparison between analogue and digital: production/editing/copy distribution, Thompson 2012. Based on Naughton's comparison of analogue to digital production /reproduction. (Naughton, 2012a')

2.5.1 The technological context

It is common at the outset of technologies to predict all-encompassing and revolutionary change. However as Bolter and Grusin identify:

²¹ 'Blurring' as a consequence of technological adoption is a significant feature of networked society as identified in "Foresight: Future Identities" (Beddington, 2013) see Section 2.5.1 The technological context.

"New digital media are not external agents that come to disrupt an unsuspecting culture. They emerge from within cultural contexts and they refashion other media, which are embedded in the same or similar contexts." (Bolter and Grusin, 2000').

A view further developed by McCullough identifies:

"Humanity has had thousands of years to build languages, conventions, and architectures of physical places. Wave upon wave of technology has transformed those cultural elements, but seldom done away with them."(McCullough, 2004')

This research is framed in the context of these 'language forms' and conventions, which are evolving as society adopts pervasive digital technologies. The significance of the cultural implications of pervasive technological adoption is highlighted by the Chief Scientific Adviser to HM Government who articulates an:

"emerging trend towards 'hyper-connectivity': where mobile technology and the ubiquity of the internet enable people to be constantly connected across many different platforms. Hyper-connectivity is already removing any meaningful distinction between online and offline identities, while also blurring 'public' and 'private' identities." (Beddington, 2013b')

William J. Mitchell argues in "Placing Words - Symbols, Space and the City" (2005) that pervasive technology may produce displacement of the human agency through the networked objects around us: cash dispensers, mobile phones, in-car satellite navigation and web enabled wireless laptop computers. Which:

"contrary to once-popular expectation, however, ubiquitous digital networking has not simply ironed out the differences among places, allowing anything to happen anywhere, any time. Instead, it has provided a mechanism for the continual injection of useful information into contexts where it was once inaccessible and where it adds a new layer of meaning." (Mitchell, 2005')

This context extends to the potential for remote making and digital crafts. These 'new layers of meaning', currently manifest as Web2.0, are engendering the evolution of new forms of manufactured objects from 'Object' to 'Object2.0' (see Table 3 p.72). 'New layers of meaning' influence printmaking practice as it evolves into 'Printmaking2.0' and the mainstreaming of technologies can be seen, which enables new dimensions and contexts for Printmaking2.0.

Amongst traditional printmakers digital technology in printmaking practice is predominantly seen as a tool or mechanism in traditional studio practice. The sample of earlier data from a pilot survey undertaken during the framing of this research illustrates this and is provided in Figure 2: sample of responses from a survey of 45 international printmakers in Appendix I Qualitative Research Pilot Studies. This view of technology fails to recognise the full technological context increasingly placed in contemporary life and practice, or the opportunities afforded for new modes of practice. Mainstreaming new approaches to technology supports the aim and objectives of this research and its contribution to printmaking knowledge.

Type of object	Artifact	Machine	Product	Gizmo	Spime	Biot
Timeline	Beginning of mankind	1500s onward	1900s onward	About 1990	About 2004	Around 2070
	Object				Object 2.0	
Sterling's classification of created object evolution	Simple artificial objects, made by hand, used by hand, powered by muscle	Complex, precisely proportioned artifacts with many integral moving parts that have tapped some non-human, non animal-power source	Widely distributed, commercially available objects, anonymously and uniformly manufactured in massive quantities, using a planned division of labour	Highly unstable, user-alterable, baroquely multi-featured objects, commonly programmable, with a brief lifespan	Manufactured objects whose informational support is so overwhelmingly extensive and rich that they can be regarded as material instantiations of an immaterial system	Entities that are both object and person - "shape their own shape"
	Printmaking				Printmaking 2.0	
Classification of printmaking processes	Typified by stencilled rock art and simple object / block printing transferred images.	Typified artisan operated printing press transferred images produced by engraving, intaglio* and stone lithography*	Produced using mechanized offset lithography, Xerography,	Typified by Fax Prints, early net and web art inkjet prints IRIS printing and mass digital printing	Digitally mediated art objects curated and conserved via established international multimodal networked systems – often as adjunct to major art museums creative commons repositories capable of instantiation and re instantiation†	Possibly three dimensionally grown / fabricated from organic cellular base stock
†Denotes Gap in Knowledge explored by this research.						

Table 3: Classification of printmaking processes (Thompson) mapped against the "Evolution of Objects" model (Sterling, 2005') as adapted by (Marshall, 2008')

Mobile devices such as smart phones (currently iPhone, Blackberry and Android) and wireless tablets (including Apple's iPad) are the latest personal devices. These have "become not just a vital tool for staying in touch while on the move, but a media reception and production platform that is more closely integrated into our lives than any other form". (Cameron, 2006') He further argues "that the mobile phone has become a media form in its own right so rapidly, and with so little fanfare, makes mobile media and their social impact an increasingly interesting and important area of study for those working in media, communication and journalism" (Ibid). This is

equally true of those artists practicing in mediated forms such as David Hockney ²², John Goto ²³ and Annie Leibovitz ²⁴. This convergence of technology in the networked portable device and its ubiquity provides an entirely new medium for the printmaker.

These technologies incorporate the development of 'geotagging', where metadata may be added to a digital document, photograph, video, drawing or print. They provide a geographic context to the work in the form of latitude, longitude, altitude and time-stamping accessible through GPS mapping via smart phones and tablets. 'Virtual layers' where meta layers of information are placed at a location/object via GPS and provide access to material which, so far, is largely informational but equally may be a geospatially located Printmaking2.0 art editioned through e-Publication or e-Paper, as in personal digital mobile devices.

The onset of digital technologies have afforded the printmaker "radically new physical, aesthetic and conceptual frameworks" (Pengelly, 2001') from 2 dimensions to 3 dimensions; an idea which this research argues may be extended given the new technologies of virtual layering. They may afford the transition from two and three dimensions to a fourth (temporal) dimension. Forming the new areas of printmaking practice this research examines through its practice based research probes, which explore the philosophical questions around the impact of e-culture, post-physical working, new modes of print-based artistic practice and notions of the indexicality* of the print itself in augmented and virtual contexts.

²²HOCKNEY, D. 2011. *Fleurs Fraiches*. Paris: Fondation Pierre Bergé-Yves Saint Laurent,.

²³GOTO, J. 2012. *John Goto* [Online]. UK. Available: <http://johngoto.org.uk/> [Accessed 9th December 2012.]

²⁴"*Photographer Annie Leibovitz recommends iPhone as a camera.*" SANDE, S. 2011. *Photographer Annie Leibovitz recommends iPhone as a camera* [Online]. TAUW. Available: <http://www.tuaw.com/2011/11/16/photographer-annie-leibovitz-recommends-iphone-as-a-camera/> [Accessed 3rd February 2013.]

2.5.2 Artistic practice

Printmaking2.0 (new printmaking) as a digitally mediated and networked 'post-studio' (Platzker and Wyckoff, 2000') practice has been developed in previous chapters, however we may add Kushner's observation that:

"There are times in the history of art when a new medium forces one to reconsider all previously defined assumptions. Such was the case with photography in the mid-nineteenth century and such was also the case with computers in the late-twentieth century. For a while, people were not even in agreement as to exactly what a computer print actually was." (Kushner, 2009').

Analysis of key digital exhibitions (see Figure 11 p.49) ranging from "Experimentelle Ästhetik" (1959) through to "Decode: Digital Design Sensations" (2010) trace the development of digital arts. In a context in which we can see 'Blurring' between what constitutes printmaking and the broader visual arts in the digital domain was mainly based on the necessity for early practitioners to externalise their work. The output of early computer based works were in paper based form, as prints and plots using methods often involving printmaking processes such as screenprinting and lithography, forming a resonance between digital constructs and traditional printmaking methods. For example Manfred Mohr's P-197 (1977-1979), a screenprint on paper made from a plotter drawing, Georg Nees's Shotter, a lithograph from a digital print and Frieder Nake's Homage à Paul Klee 13/9/65Nr.2 (1965), a screenprint created from a plotter drawing (see Figure 25 to Figure 27 p.75 - 76).

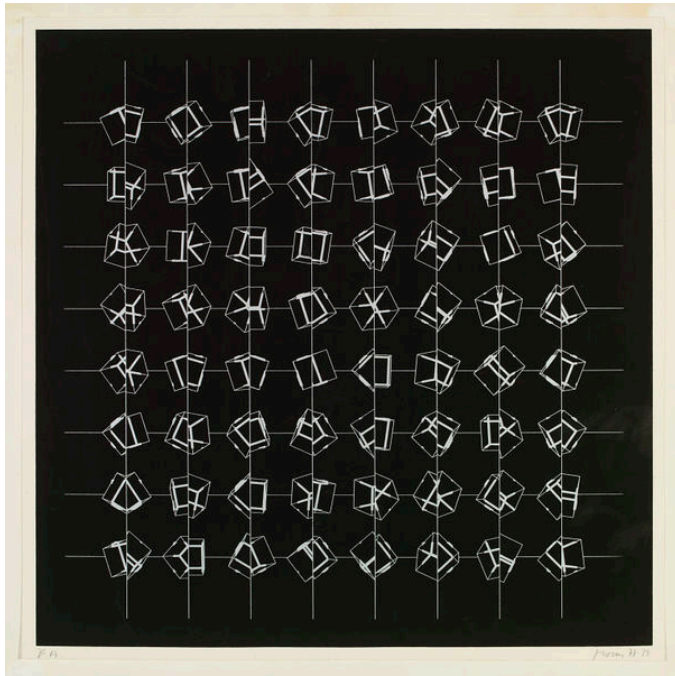


Figure 25: P-197 1977-1979 (screenprint from digital) (Mohr, 1977- 79' screenprint on paper made from a plotter drawing)

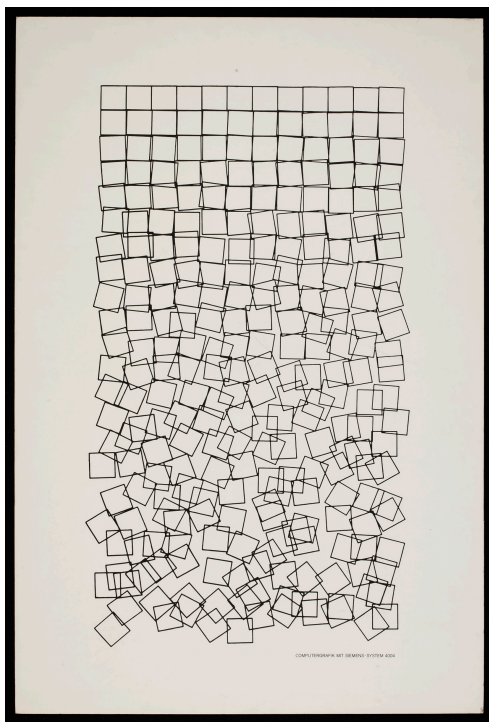


Figure 26: Shotter (lithograph from a computer-generated drawing) (Nees, 1968-1970' Lithograph in black ink from a computer-generated graphic)

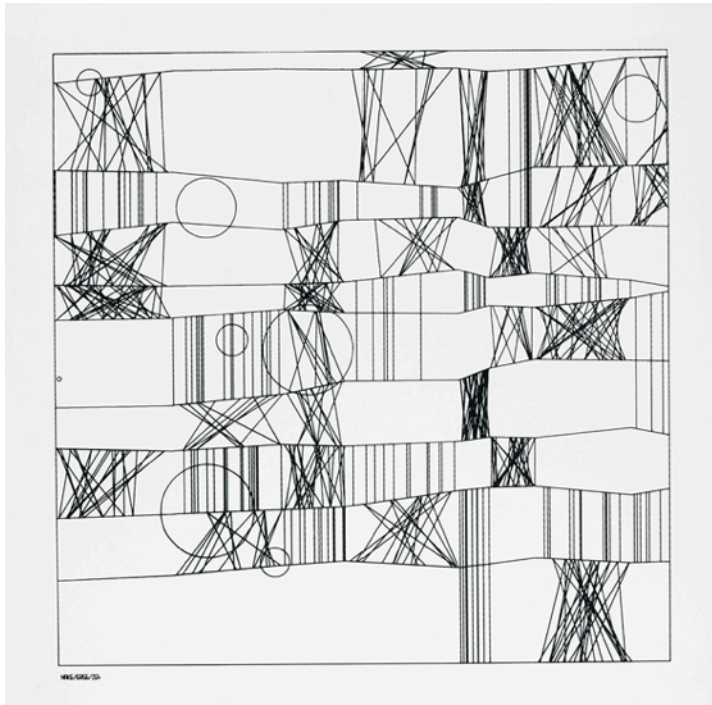


Figure 27: Homage à Paul Klee 13/9/65 Nr.2 (screenprint on paper from plotter drawing) (Nake, 1965' Screenprint on Paper from Digital)

The history of digital art and printmaking is embodied in key exhibitions such as: 'Digital Pioneers' V&A London, 'Electronic Print' Arnolfini Gallery Bristol and others as identified here (Figure 11). Comprehensive historical overviews are provided by: "A computer in the art room: the origins of British computer arts 1950-80" (Mason, 2008') and The Digital Art Museum - (DAM)/Artists²⁵. Examination of the Digital Art Museum's online publication provides a key to separating the "blurring" between digital arts and digitally mediated printmaking, illustrated in Figure 28: Evolutionary divergence of digital printmaking and digital arts. DAM "... have grouped all positions in three phases: The Pioneers, The Paintbox Era and The Multimedia Era" which represents the evolution of digital art. During the 'Pioneers' and 'Paintbox Era' there is a distinct relationship to the area examined here as digital printmaking.

²⁵ <http://dam.org/dox/2294.DMOB7.H.1.De.php>

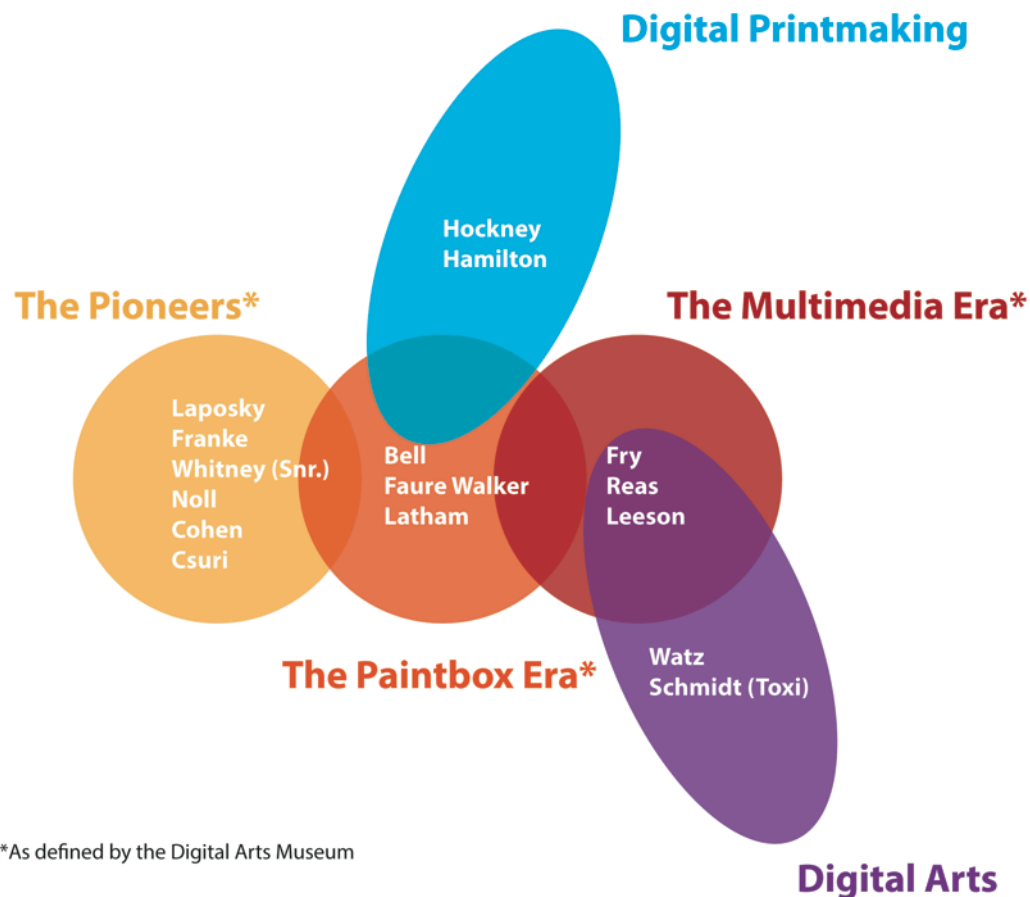


Figure 28: Evolutionary divergence of digital printmaking and digital arts

In the post 'Paintbox' period the forms have diverged and digital arts now follow a distinct, if related, pathway to digital printmaking. Consequently this research explores the practice in digital printmaking rather than the broader practices of digital arts.

A "Taxonomy of Contemporary Printmaking" was devised (see Figure 5 p.24) in Section 2.2 Printmaking2.0 - The digital matrix: philosophy and context (p.23). Printmaking and its constituent artistic practices were categorised into four domain matrices: 1) traditional printmaking - direct matrix, 2) traditional printmaking - transferred matrix, 3) digital printmaking - electromechanical matrix and the emergent domain 4) Printmaking2.0 - digital matrix. Review reveals significant artistic practice lies within domains 1-3 (as illustrated in Figure 7: Analytical taxonomy of submitted print practice p.29 and Figure 8 Analytical Taxonomy of Contemporary Printmaking Practice p.31). Domain 4 Printmaking2.0 -

digital matrix is not represented here as it forms a gap in knowledge explored through practice (see section 4.2 research probes). The innovation adoption curve for digital printmaking (Figure 3 p.20) was used to select the following printmaking outputs (drawn from two recent major survey exhibitions²⁶) within the context of domains 1-3

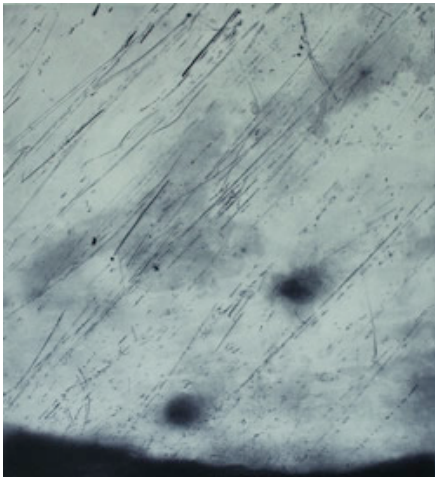


Figure 29: Poeira de São Paulo, (2009) by Debora Ando

Figure 29 is representative of traditional practice; using traditional intaglio techniques of spitbite and dry point on paper Ando's work, which is limited by edition, these are the key markers of a traditional work and are representative of domain 1) traditional printmaking - direct matrix



Figure 30: Framing Nature - Trees, (2008) by Paul Coldwell,

²⁶ a) The Northern Print Biennale. Northern Print Studio Newcastle/Gateshead 2009
& b) Exhibitions IMPACT 6 UWE Bristol 2009

Figure 30 was digitally mediated from digital photographic and vector graphic software to produce photopositives, for realisation through a traditional (analogue) print method screenprint on paper. This work, limited by edition, shows the key markers of a hybrid and is representative of domain 2) traditional printmaking – transferred matrix.



Figure 31: Circles II, (2009) by Jenny Smith

Figure 31 originated from a traditional matrix (screenprint) and was innovatively finished through digital process (laser cutting). This work, limited by edition, also shows the key markers of a hybrid and is representative of domain 2) traditional printmaking – transferred matrix.

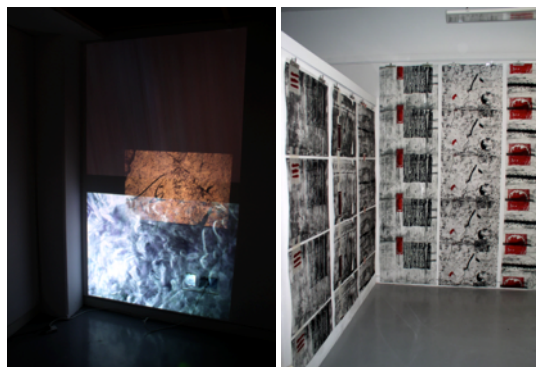


Figure 32: Medium and Meaning, (2009) by Bren Unwin

Figure 32, a print installation, uses both digital matrix and digital print methods including digital projection, imprinting the image to a surface using

light, showing multiple forms of instantiation as temporal and physical print. This evidences the key markers of 2D digital and is representative of domain 3) digital printmaking – electromechanical matrix, although the projection may be considered a step into post-physical form.

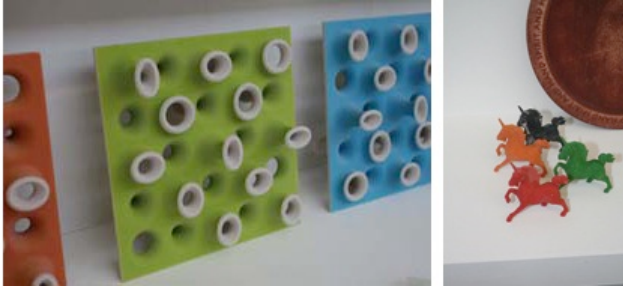


Figure 33: 3D prints, Trumpet Tiles, Peter Walters (2009) [left] and Unicorns, David Huson (2009) [right].

Figure 33 works produced as part of the CFPR 3d printing research group, Walters' and Huson's work examining 3D printing are prime examples of the new forms of physical printmaking through the digital medium. They show the key markers of 3D digital and are representative of domain 3) digital printmaking – electromechanical matrix.

Review of Ando's work establishes the baseline of traditional practice using a direct matrix. Smith and Coldwell's work are primary examples of the adroit use of digital tools in producing a hybrid print, in Smith's case, from a traditional matrix but using digital tools in finishing and Coldwell's work is the reverse. The examples from Unwin and Walters illustrate artistic printmaking practice instantiated in new forms of materiality from digital processes including laser cut, archival inkjet, 3D printing and digital projection.

With the exception of digital projection, these processes/forms constitute physical instantiation rather than the temporal forms also possible through the digital medium. They remain in the domain of traditional or physical printmaking. The new domain of Printmaking2.0 is related to traditional practice and this research proposes it is now sufficiently evolved to be considered a distinct 'new' practice rather than a sub-process or tool.

However it is distinct from other post-studio practices such as digital art, internet art and digital architecture.

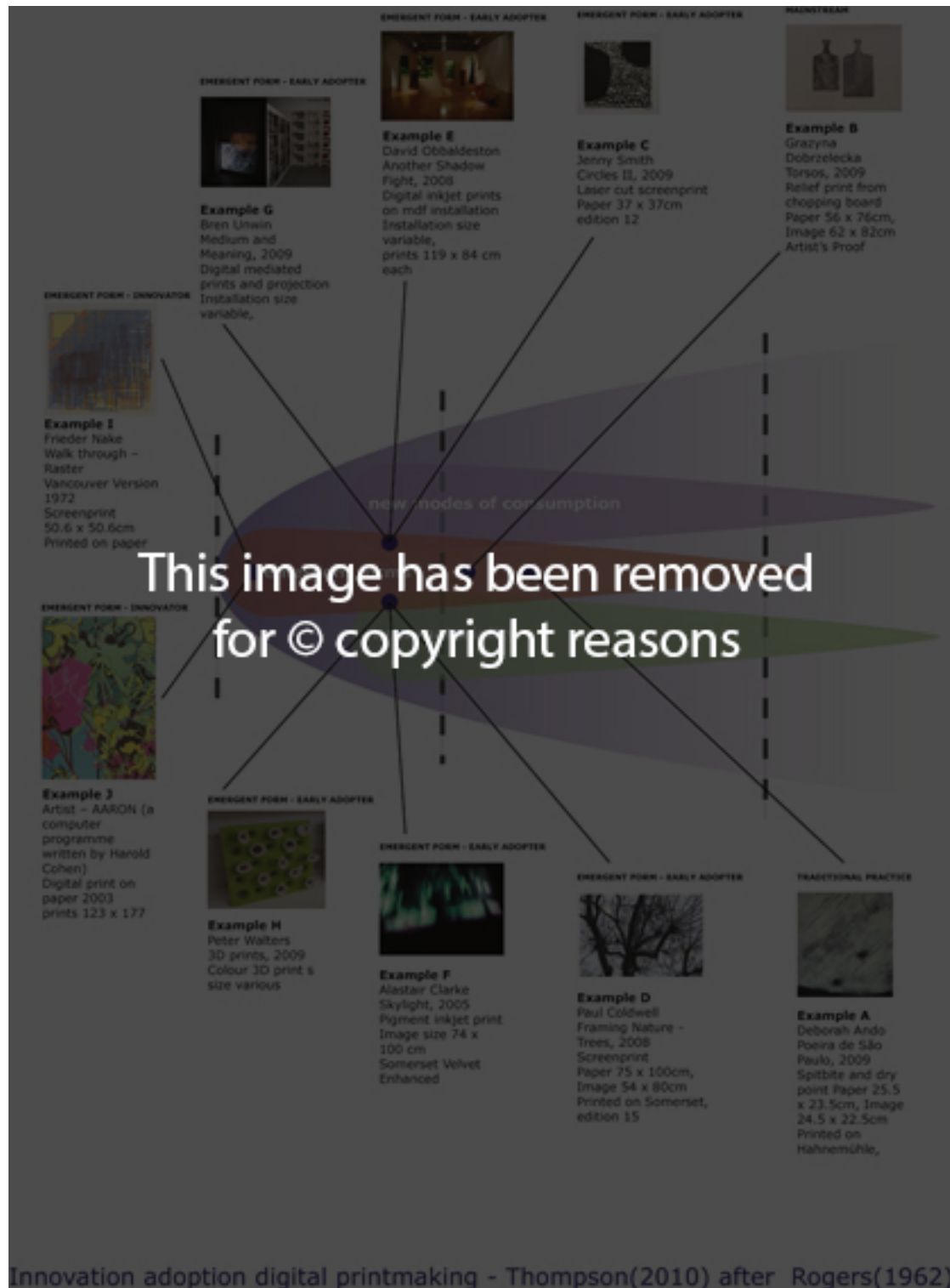


Figure 34: 'Populated' innovation adoption curve for digital printmaking – Thompson (2010) after Rogers (2003)

2.5.3 Academic discourse

Academic discourse has gained significant momentum, in recent decades, from what was ostensibly a practice only base. This development is largely as a result of conference series through IMPACT, the Southern Graphics Council, the Mid-American Print Council and refereed journals such as IMPRINT, Art in Print and Print Quarterly. The development of digital technology has also formed an increasing and important area of academic discourse across many disciplines. The visual arts and printmaking have been no exception. At IMPACT II Barfield, Barfield and Whale identified that rather than "digital technology being accepted and appropriated into the range of printmaking methods" (Barfield et al., 2001'), the practice of "printmaking itself may be subsumed into a larger and more diverse world of replicable, transmissible, mediated art and communication" (Ibid) and both printmakers and audiences would "need to adjust to this new conceptual framework" (Ibid) for the benefit of all. The authors identified that "the fetish of the hand-made print on paper will continue to diminish in importance as the ability to create, modify, send, receive and translate digital information continues to change the way art is made." (Barfield et al., 2001'). This is further expanded by Sue Gollifer who identifies that the "cultural shifts" caused by "redefinition of culture in contemporary terms" as a result of digital adoption "may blur, remove, or even reinforce boundaries commonly associated with the activity of fine art/printmaking." (Gollifer, 2005'). This discourse therefore is key in the foundation of this study.

Review of this literature²⁷ reveals the most significant area for this research is the perceived dialectic between traditional and digital printmaking.

²⁷ This review draws on a broad range of discourse from across disciplines however the following form the core: the IMPACT, SGC, MAPC and SIGGRAPH conference series, FADE, CFPR and Creativity and Embodied Mind in Digital Fine Art AHRB funded research programmes. Doctoral study/thesis by Ashe (2001), Atkinson (2005), Barfield (1999), Collins (2001), Graham (1997), Hamilton (2006), Ho (2001), Marshall (2008), Pengelly (1997), Taylor (2004), Treadaway (2006), Verschooren (2007), West (2009) and Laidler (2011). Scholarly publication through Art Journal, Artmusephere, Creative Review, E-Learning, Journal of Computer Mediated Communication, Journal of the American Institute for Conservation, New

Analysis suggests classification according to the model illustrated in Figure 3: Innovation adoption curve for digital printmaking – Thompson (2013) after (Rogers, 2003') [p.20] which is associated with three groups: New Practitioners (innovators and early adopters), The Mainstream (early and late majority) and Traditionalists (late adopters). The 'Traditionalist' argues that digital technologies are not the scope of fine print practice. This is identifiable within the context of printmakers "whose point of reference is the past" (Rogers, 2003') and whose points of reference steadfastly lie in "what has been done previously" (Ibid).

'The Mainstream' are practitioners accepting the technology, who through their practice have integrated it as a process tool in their practice, for this category they "may deliberate for some time before completely adopting a new idea" (Rogers, 2003'). The mainstream focuses on the use and practical application of digital tools in the process of traditional printmaking.

'New Practitioners' are the most significant, the avant-garde and cutting edge artists who develop new forms and practice and are "gatekeepers" (Rogers, 2003') controlling "the flow of new ideas" (Ibid). Traditionalists suggest that the use of digital tools constrain the expressive opportunities for the print artist. However Candy argues that the technology in itself opens new opportunities, for example "using some form of programming techniques" (Candy, 2005'). This provided the stimulus to explore 'Code as Process', see sections 3.4.2 and 4.2.2 pertaining to Research Probe 2 Code as process: Explorations of temporality. Contrary to arguments regarding constraint, Thirkell identifies "the ability of digital technology to pull together mediums from diverse backgrounds and combine their characteristics creatively, using methodologies once common only to print, has created something of a borderless state." (Thirkell, 2005'). This is developed in Research Probe 4 (see sections 3.4.4 and 4.2.4).

Significant discussion surrounds the archival quality of digital prints, focussing on the archival qualities and inks and papers. A discussion which

may be considered redundant considering the findings of Paul Laidler's thesis [Section '3.3.4 Archival Standards' (Laidler, 2011')] and increasing acceptance of archival wide format printing in workshops and their editions. This, however, is not the focus this study, given that this research is concerned with transmissible art as proposed by Barfield and the subsequent questions surrounding post-physicality in printmaking practice. The potential shifts in practice models afforded by digital technology challenge the print artist to examine new concepts of practice beyond the imprint on paper. Establishing models for the practice of Printmaking2.0 through the research probes designed for this study, see Sections 3.0 Methodology and Data Gathering and 4.0 Results.

2.5.4 Transition to new printmaking

Printmaking is founded on tradition and permanence, employing some techniques and working methods hundreds of years old; conversely it also espouses new developments and technological change. There is a spirit of innovation, adaptation and invention in printmaking which results in the rapid development of methods and practice models amongst the diverse international community of practitioners, for example the adoption of screen printing amongst post WWII USA print artists such as Landon, Sternberg and Maccoy. This is one of the paradoxes of printmaking; it is founded in and defined by tradition but also wholeheartedly and passionately pursues innovation. It is against this context that the Oslo Academy of the Arts during the 1980s, met the:

“challenge from the ever returning success of painting, printmaking abandoned its tradition of the intimate book sized format and expanded beyond the capacity of the presses to accept woodcuts requiring the weight of steam rollers. Ideal focus lay on the monotype: the fewer the copies printed, the more dignified as art – this was printmaking as close as it gets to painting” (Liestol et al., 2003')

This had become “an awkward way to practice painting” (Ibid) and The Academy’s response was to abandon the competition with painting and re-emphasise reproduction through media:

“printmaking now meant anything graphic that could be reproduced regardless of technique, from woodcut to photography to digital media, that is a move to the complete desacrilisation of the original, including everything that inflated the value of the pictorial object and its authenticity,” (Liestol et al., 2003')

as part of a “covert modernisation” and to “adapt it to the possibilities of digital media” (Ibid).

The events in Oslo are not singular and can be traced in the approach of commercial print studios, Tyler Graphic Studios and Advanced Graphics London for example. Illustrating a continuing strand in contemporary print practice, where the potential for mass cultural elucidation “free from its cultic roots” (Benjamin, 1936') is self limited by mimicry of painterly practice and the gallerist’s ‘edition’. The digital media theoretician Lev Manovich identifies the paradigm shift that:

“Cinematic ways of seeing the world, of structuring time, narrating a story, linking one experience to the next have become the basic means by which computer users access and interact with all cultural data. In this respect the computer fulfils the promise of cinema as a visual Esperanto, a goal that preoccupied many film artists and critics in the 1920s, from Griffith to Vertov” (Manovich, 2001').

Digitally mediated printmaking may have the same potential for paradigm shift, just as suggested by Benjamin that photography and film were uniquely placed to open art to the masses. In the evolution of printmaking multiple coding can become prevalent as a common language of the transferred image, printed to electronic surfaces. The transition to printmaking 2.0 lies not in adopting new tools to make traditional works but with wholeheartedly espousing the potential of the medium to make work in new and innovative ways.

2.5.5 Summary of section: emergent forms

Emergent or 'new forms' in digitally mediated printmaking practice are the product of innovators and early adopters (as defined by Thompson, DAM and Rogers). Avant-garde and cutting edge artists develop new forms of practice at the technological edges of contemporary digitally mediated art practice, applying the products of innovation. These 'emergent forms' might be considered in terms of a paradigm of second-generation print. Kushner describes them as: digitally mediated works printed in 2 dimensions, 3 dimensions or even virtually from a 'digital matrix'. Printmaking2.0 is uniquely placed to go beyond the mere use of digital tools for layering (visual image over visual image) and to create complex meaning through meta-informational and virtual layering via the internet and pervasive networked computer technology. These are 'emergent forms' of printmaking practice, where original print is created through technological means and is made available on demand. They are new forms of printed objects which are multiply produced from new types of matrixes and printed using materials that are no longer bound in two dimensions or even physical space.

Printmaking2.0 is framed by technological evolution as mainstream society adopts pervasive digital technologies, enabled through Mitchell's conception of digital layers of meaning engendering new concepts of objects occupying physical, virtual and hybrid space. The convergence of technology in networked portable devices, smart phones and tablets or e-surfaces and their mass uptake offers the potential of an entirely new medium for digitally mediated printing, a construct of Emergent Forms and New Materiality. Printmaking2.0 may be viewed as a new and distinct form of printmaking which is a digitally mediated and networked "post-studio" practice (Platzker and Wyckoff, 2000'). Utilising the 'lingua franca' of digital culture and practice, it is free from ideas of the limited edition and analogue philosophy. New forms of meta-information/metadata publication emerge as virtual print form from the digitally mediated second generation print objects and create new areas of printmaking practice.

2.6 The philosophical context of the digitally mediated art object.

This research is founded on questions of a 'digital matrix' and post-studio second-generation printmaking, developed in Section 2.2. The research identified four key and interconnected fields 'the Topoi of Review'. The three principal fields; materiality and signature, modes of consumption and emergent forms inform the remaining topoi, the philosophical context of the digitally mediated art object (see Figure 2: The Topoi of Review (p.20). The frameworks of the principal topoi are focused on the material and applied context of digitally mediated art objects, they also provide related drivers for a wider philosophical discourse. The philosophical tensions from these digital transitions and post-physical practice(s) are inherent.

Digitally mediated printing resulting from the new materiality and physicality of e-surfaces and augmented reality are implicit, through ubiquitous "hyper-connectivity" (Beddington, 2013b) and notions of 'post-physicality'. Whilst digital materiality, fluidity and the almost cultic status of signature, raise philosophical questions about the materiality, permanence and authenticity of post-studio, post-physical print objects. Equally the production and consumption of cultural products through digital mediation and mass digital participation are opening entirely new forms of cultural consumerism, with new concepts of materiality connoisseurship and expertise for the print artist. Emergent forms of printed objects are engendering new concepts of imprinting in physical, virtual and hybrid space in the 'lingua franca' of digital culture and practice. This suggests limited edition and analogue philosophy may no longer be applicable and philosophical questions arise about 'Aura', the digital medium and simulacrum, materiality and permanence, instantiation and temporal form and authenticity.

2.6.1 'Aura'

Benjamin's seminal essay "The Work of Art in the Age of Mechanical Reproduction" sometimes more accurately translated from the German as "The Work of Art in the Age of its Technical Reproducibility" (Das Kunstwerk

im Zeitalter seiner Technischen Reproduzierbarkeit) is often quoted in relation to mediated art forms and critical theory.

In its original German and in translations it is prefaced by an extract from "Pièces sur l'Art" Valéry, P. (1934). Benjamin builds on Valéry's summation that the fine arts and their divisions were founded in a time very different to the present day. Valéry argues that the "physical component" present in all arts "... cannot continue to be considered and treated in the same way as before; no longer can it escape the effects of modern knowledge and modern practice" (Valéry, 1931'). He further suggests that "neither matter nor space nor time is what, up until twenty years ago, it always was" (Ibid) The arguments Valéry proposes are valid nearly a century later, certainly the reflection on physical and temporal shift in relation/response to technological advance resonates with the argument in this research.

Benjamin proposed that technological reproduction of art manifest through:

"wood engraving joined in the course of the middle ages by copperplate engraving and etching..." (Ibid), but lithography, photography and film removed art work from its uniqueness with a loss of its greatness, cultic uniqueness and physical provenance. "We can encapsulate what stands out here by using the term 'Aura', we can say: what shrinks in an age where the work of art can be reproduced by technological means is its 'aura'." (Benjamin, 1936')

Benjamin proposed that the "here and now of the original constitute the abstract idea of its genuineness" (Ibid p.5) but he offsets this with the value of reproduction reaching the masses:

"above all, it makes it possible for the original to come closer to the person taking it in, whether in the form of a photograph or in that of a gramophone record. A cathedral quits its site to find a welcome in the studio of an art lover; a choral work performed in a hall or in the open air can be heard in a room." (Ibid p.6)

Benjamin's concern for 'Aura' is partly a consideration of the cultic and ritualistic value of the art object and in his own sense of the importance of

the revolutionary forms of photography and cinema in the education of the masses. Digitally mediated printmaking practice has the potential for forming a position as a reproductive medium however when used by the artist, is also a unique medium capable of generating its own, new forms of 'Aura'. Benjamin stated: "Within major historical periods, along with changes in the overall mode of being of the human collective, there are also changes in the manner of its sense of perception" (Ibid p.8). Benjamin's discourse on Aura precursors the "Five Degrees of Originality" (Hayter, 1962') and the "Code of Ethics for Original Printmaking" (Malenfant and Ste-Marie, 2000') which attempt to provide an accepted definition of the print as art as opposed to 'reproductions'. These standards are usually accepted in traditional printmaking practice.

Concurrent with originality is connoisseurship, in which expert knowledge of printmaking processes and the aesthetic of the traditional print form is added to the outcomes and functions of the art object in the establishment of its 'aura'. The 'aura' of fine art print is an object of authority, unlike print for mass communication. The fine art print is an instantiation of visual culture through artistic dissemination and can take different forms. Historically, both connoisseurship and standards of originality have been modified with new technological methods of making prints from wood engraving through to lithography and serigraphy*. This process is continuing with the advent of new technology as discussed in "Printmaking and New Technology" (Malenfant and Ste-Marie, 2000') and academic discourse (see Section 2.5.3 Academic discourse p.82).

Benjamin identified:

"Within major historical periods, along with changes in the overall mode of being of the human collective, there are also changes in the manner of its sense perception." (Benjamin, 1936')

One of these 'major historical periods' with its incumbent changes in 'mode of being' and 'changes in the manner of its sense of perception' can be seen

in the digitally mediated and increasingly participative global social change of today as discussed by Negroponte²⁸ and Prensky²⁹ and qualified by Beddington³⁰. The post-studio post-physical print engages new sense perceptions aligned with concepts of "modular creativity*", "remixability*" (Manovich, 2005b') and notions of "folding*" (Deleuze, 2006'). In which the digitally mediated art object carries with it the possibility of its own new type of 'aura', formed of its meta-data, data/image shadows and the aesthetic values of Generation Y*.

2.6.2 Digital medium and simulacrum

Valéry's *Pièces sur l'Art* 1934 (referenced by Benjamin in "The work of art in the age of mechanical reproduction" [1936]) identifies:

"Just as water, gas and electric power come to us from afar and enter our homes with almost no effort on our part, there serving our needs, so we shall be supplied with pictures or sound sequences that, at the touch of a button, almost a wave of the hand, arrive and likewise depart." (Valery, 1931')

This essentially predicts both television in the mid 20th century and the digital medium now pervading the early decades of the 21st century. A medium in which Malcolm McCulloch (2004) identifies:

"... we have witnessed a paradigm shift from cyberspace to pervasive computing. Instead of pulling us through the looking glass into some sterile, luminous world, digital technology now pours out beyond the screen into our messy places, under our laws of physics; it is built into our rooms, embedded in our props and devices everywhere." (McCullough, 2004').

²⁸*Being digital*, Negroponte, (1995). London, Hodder & Stoughton.

²⁹Digital Natives, Digital Immigrants Part 1. Prensky, (2001). On The Horizon - The Strategic Planning Resource for Education Professionals, 9, 1-6.

³⁰Foresight Future Identities Final Project Report. Beddington, (2013). London: The Government Office for Science.

The computer has become more than commonplace, as Marc Prensky identifies "the arrival and rapid dissemination of digital technology in the last decades of the 20th century" (Prensky, 2001' 1-6) was in fact a "singularity" – an event which changes things so fundamentally that there is absolutely no going back" (Prensky, 2001' 1-6). The consequence of which was the birth of the "digital native" – humans born into a digital age and speaking digital language natively, as opposed to 'digital immigrants' who, born into the analogue age, have learned the language and speak it with an accent, whilst conceptually continuing to think in analogue.

Technology alone does not infer a culture, but the existence of a digital culture is increasingly apparent. Deuze identifies the "values, practices, and expectations regarding the way people act and interact within the network society" and the way these affect "the ways in which we ... give meaning to living" (Deuze, 2006' 63-75) in a 'hyper-connected society'; identified in the "Foresight: Future Identities Final Project Report" (Beddington, 2013a'). The origins of digital culture lie in elements of "cold war defence technologies (internet); avant-garde art practice; counter-cultural techno utopianism (and) postmodernist critical theory" (Gere, 2002'); made available by rapid and increasingly cheaper mobile and fixed broadband services (OFCOM, 2009'). And therefore within digital culture "citizens will increasingly be characterised as hyper-connected individuals who make choices, which reflect their identities" (Beddington, 2013a'), although "traditional notions of identities are likely to become less meaningful in the digital age" (Ibid).

The significance of the internet and its associated effects on society are often compared to the impact of Gutenberg's press³¹. The cultural shifts caused by the invention of the printing press and moveable type are now a matter of historical reflection. This "imposed a level of standardization in language" (McLuhan, 1967') which was arguably the medium of new cultures such as the Renaissance. Similarly the emergence of a

³¹See From Gutenberg to Zuckerberg: what you really need to know about the Internet, (Naughton, J. 2012)

"technosocial culture" (Sterling, 2005') in which Nicholas Negroponte optimistically believes: "the harmonising effect of being digital is as previously partitioned disciplines and enterprises find themselves collaborating, not competing" and a "common language emerges, allowing people to understand across boundaries" (Negroponte, 1995'). The philosophical contexts of Printmaking2.0 may reside, therefore, in contemporary, ubiquitous, socially networked digital culture.

The place where digital culture, the 'digital native' and consequently Printmaking2.0 reside may be viewed as Gollifer suggests equally as "dystopic" or "utopian"(Gollifer, 2005'). In this context the question of simulacra arises. Jean Baudrillard contends: "that we now inhabit a world of hyper-real simulacra" (Sim and Van Loon, 2004'). Baudrillard argues, "by crossing into a space whose curvature is no longer that of the real, nor that of truth, the era of simulation is inaugurated by a liquidation of all referentials ..." (Ibid) and he suggests three orders of simulacra:

"The counterfeit is the dominant schema in the 'classical' period, from the Renaissance to the Industrial Revolution. Production is the dominant schema in the industrial era. Simulation is the dominant schema in the current code-governed phase" (Baudrillard, 1993').

With 'simulation' a virtual manifestation is created, for example in the virtual world 'second life' and multiplayer gaming (real life and role playing). A context in which the 'adult' elements of digital activity may conform more to a "Society of the spectacle" (Debord, 1983') rather than a meaningful and ubiquitous digital culture through the medium of pervasive computing. If Baudrillard views the digital dimension as "hyperreal simulacra", a view couched in the analogue of the digital immigrant, the opposite is found in Sterling's "Spime" and Deleuze's "Fold" which, as discussed in Section 2.3, provides the technological wherewithal for the development of a second generation of printmaking, Printmaking2.0, to meet notions of post-studio and post-physical practice through hyper-connected, ubiquitous, socially networked, media in virtual contexts within new notions of physicality. Notions founded in new aesthetics and a common digital language, which

recognises the intellectual processes inherent in Manovich's idea of remix culture.

2.6.3 Materiality and permanence

Conceptually Printmaking2.0 prints are created in "... a dynamic time-based interactive software-hardware environment" (Acevedo, 2003') and evoke a different 'aura' and form of materiality. These are new types of objects which are "instantiations of an immaterial system" (Sterling, 2005') and consequently enforce a re-examination of concepts of materiality and permanence.

Traditional printmaking practice views materiality and permanence as two of the key constituents of the value of print. Combined with signature/provenance and limiting the editions, these elements may contribute to notions of connoisseurship and 'aura'. Within printmaking there is a predisposition towards making works on paper which "can be damaged by light, extreme or fluctuating temperature and relative humidity, pollution, pests, and poor handling, storage and mounting" (The-Conservation-Register, 2006'); evidenced by the temporal nature of paper itself. Therefore the practical application of 'archival quality' in the selection and use of the materials and processes in printmaking become significant. Traditional processes have evolved over time, as have the means of conserving them. It was logical that with the development of the new materials, mechanisms and methods in digital printmaking from an electromechanical matrix there would inevitably be a delay in the development of new means of conservation and methods of archival³². Yet this situation is generally much improved and the general acceptance of archival digital print is now common in commercial, academic and artistic editions.

³³In the context of digital instantiation to physical form, (two dimensional and three dimensional printing) the Centre for Fine Print, University of the West of England, Bristol have made major advances in this area.

Once notions of post-physical practice are adopted the art object's physical permanence is no longer significant. The 'print' is in the manner of the 'objectile*' where "the object assumes a place in a continuum by variation" (Deleuze, 2006'). This is a context in which Christiane Paul identifies "issues of embodiment V disembodiment and the perception of space" (Paul, 2003') in conjunction with virtual reality. It is also applicable to augmented reality given the idea of a "virtuality continuum" (Milgram and Kishino, 1994'). Print forms are potentially temporal, disembodied and spatial (imprinted from virtual to physical space), thus separating post-physical prints from the conventions of traditional print forms.

In this context Barfield's work on "Spatial ontology and digital print" (Barfield, 2002' 26-35) is seminal. As these print forms are located "in non-perspectival pictorial spaces" (Ibid) and therefore may require "artistic applications of alternatives to three-dimensional Euclidean geometry" (Ibid). Barfield highlights the importance of a fourth dimension and the (historical) confusion between this concept and time, identifying that "while time is a fourth dimension, it does not replace the notion of the spatial fourth dimension, with which it is often confused" (Ibid). In this research, however, the fourth dimension is identified as 'digital space' as defined by Kilian, which in its relationship to physical space imposes ideas of temporal and relative time.

Manovich identified: "The 1990s were about the virtual" (Manovich, 2005a') which in the early part of the 21st century has been replaced by augmentation "... physical space filled with electronic and visual information" (Ibid). The shift Manovich discusses can be physical as well as virtual if experienced, for example, by walking through an area such as Piccadilly Circus in London or any other similar analogue augmented space. The space is augmented and our passage renders it temporal. Conversely with personal portable augmented reality in its broadest sense carries the means of augmentation increase. It can purposefully be both recipient of augmentations or augment the spatial locale with our own passing, through geo-tagged posting of our personal perceptions via image sharing social media. We have gathered our experience of time and space (temporal

experience) and imprinted it on the virtual continuum. These new ideas of materiality and permanence are explored through the research probes, which question traditional concepts, of materiality and permanence through post-physical and temporal models of practice.

2.6.4 Instantiation and the temporal form

"The ability to play with time, to postpone it, to quicken it, is a distinctly modern phenomenon." (Demos, 2007'). However the idea of time in analogue technological visual art is often either: freezing temporal representations of physical space in photography or sampling it in time-lapse film and video loops. In the digital context, as Corcoran identifies: "discussion within digital culture is dominated by the metaphor of space beginning with the very term 'cyberspace'" (Corcoran, 1996' 375-378) She argues this extends to virtual reality: "because of its ability to render three-dimensional representations of objects that seem to exist in, once again, space" (Ibid). From her own experience Corcoran argues that, given the potential of the narrative and performance aspects of digital art: "it would be good to expand our notion of what the new medium in fact is and to effectuate a shift from digital art objects to digital art activities" (Ibid), providing a conceptual shift beyond the bounds of traditional printmaking.

The process of traditional printmaking is by nature a linear and progressive temporal model, 'Newtonian time', with key irreversible stages involving physical changes to the material of the matrix. This leads to the fixation of time, the time of the artist's thought and the process of time, in the act of the physical imprint.

Gere argues that if the products of the analogue process become fixed, then when digitally mediated art is practiced in "real time systems" (Gere, 2006'), there is a demand in real time "for instant feedback and response" (Ibid) and things happen now. Consequently real time expectations emerge through digital mediation which, when considering Printmaking2.0, may present the post-physical object as a temporal or fluid form, capable of multiple formations through "modular creativity", "remixability" (Manovich,

2005b') and notions of "folding"* (Deleuze, 2006') in which the digitally mediated art object carries the possibility of multiple uniqueness. The artist and their spectator can 'fast forward' and 'rewind' the construct in its digital state, selecting unique moments for instantiation/consumption and revealing a relative temporal model (relativistic time). Deleuze describes the condition of the object as no longer imposed on by a "law of constancy" but with a "new status" in which "... the object no longer refers its condition to a spatial mould – in other words, to a relation of form-matter – but to a temporal modulation ..." (Deleuze, 2006').

In this context there is an argument about separation or shift in the indexicality of the print. Traditionally (as described by Sturken & Cartwright) Peirce's conceptions of index defines indexical, iconic* and symbolic signs*. Indexical signs demonstrate:

"a physical causal connection between the signifier (word/image) and the thing signified, because both existed at some point within the same physical space. For example, smoke coming from a building is an index of a fire. Similarly, a photograph is an index of its subject because it was taken in its presence." (Sturken and Cartwright, 2009').

Iconic signs provide "a resemblance between the signifier (word/image) and the thing signified. For example, a drawing of a person is an iconic sign because it resembles him or her" Ibid. In the symbolic sign however:

"there is no connection between the signifier (word/image) and the signified except that imposed by convention. For example, the word university does not physically resemble any actual university (in other words, it is not iconic), nor does it have a physical connection to the university (so it is not indexical), hence it is a symbolic sign" Ibid.

Analysis of the digital print works gathered in Research Probe 1 reveals examples of all three forms of 'sign' and, given the incidence of photographic or lens based visual elements, a closer examination of 'index' is warranted.

The photographic sign may be considered as composite of both index and icon, however the indexical aspects are emphasised in analogue photographic theory whilst conversely it is the iconic in digital photography. Dzenko and others (Bryant and Pollock, 2010') argue that the lack of physical connection between a digital photograph's subject and image shifts the function of the digital image from indexical to iconic. This may apply across a spectrum of technological, mediated and reproducible visual art forms such as photography, video, film and digital printmaking. Although founded as an indexical function the photographic or lens based element of the digitally mediated print is transformed from an indexical to an iconic sign. A similar transference is inherent in making the digitally mediated print, it is a transformed image and the significance of these visual elements and their relationship/meaning must be considered.

Notes on the Index Parts 1 and 2 (Krauss, 1977' 68-81, Krauss, 1977' 58-67), identifies "... it must be understood that there is a decisive break between earlier attitudes towards the index and those at present" (Krauss, 1977' 58-67). Krauss argues that the index in contemporary practice goes beyond any strict conception of photographic index/reality "physical manifestation of a cause, of which traces, imprints, and clues are examples." (Krauss, 1977' 58-67). This applies to work in the digital medium, for example in the case of the digitally mediated print, in which its digital state "traces, imprints, and clues" (Ibid) the components of the digital assemblage.

These new parameters of index, instantiation and temporality for the digitally mediated print challenge our conception of physical objects in space, so there is a shift in our aesthetic towards instantiation of temporal image/forms.

2.6.5 Authenticity

Amongst printmakers questions about authenticity tend to focus on 'the original print' versus 'the reproduction'; the 'authentic' over the 'copy' and

the “existence of original intent in the creation of the artefact” (Wisniewski, 2003') [see Section 2.5 Emergent Forms]. Traditionally authenticity has been “guaranteed by custodianship of the artefact” (Besser, 2001'), which as discussed in “Authenticity in Printmaking – A Red Herring?” (Pelzer-Montada, 2001'), but this is not always the case with digital works. This debate becomes less significant when accepting digitally mediated art forms as a practice in their own right, (see Section 2.5.4 Transition to new printmaking). The digitally mediated art object is just that, a digitally mediated art object and, as such, it is ‘authentic’. Pelzer-Montada argues that retaining the artist’s hand in the digital process “forms a symbolic matrix” (Ibid) and a resulting association with authenticity. Confusion occurs as a result of remediation* “the formal logic by which new media refashion prior media forms” (Bolter and Grusin, 2000') and, as predicted by McLuhan, “we approach the present through a rear-view mirror” (McLuhan and Fiore, 1967'). The application of analogue ideas in original digital dimensions is a significant hindrance to reframing considerations of digital authenticity.

Printmaking is a medium of the multiple and Rosalind Krauss comments:

“As we have been constantly reminding ourselves since Walter Benjamin’s work ‘The Work of Art in The Age of Mechanical Reproduction,’ authenticity empties out as a notion as one approaches those mediums which are inherently multiple” (Krauss, 1997').

Krauss cites the legitimate casting of a Rodin sculpture (the Gates of Hell) in 1978 “When Rodin died he left the French nation his entire estate” (Krauss, 1997'), including “the right to make bronze editions from the estate's plasters”³³ (Ibid). Casting “The Gates of Hell” some 60 years after the artist’s death is, “by perfect right of the State, a legitimate work: a real original we might say.” (Ibid). A further example of posthumous authenticity can be seen in LeWitt’s certificated wall drawings. The instructions and certificate for the work are given for its creation/installation and it is authentic at each installation. The issues illustrated in this case are

³³ Posthumously limited to twelve

twofold. First, the available set of meta-data surrounding the conception, inception, instantiation and authority providing the conditions for authenticity. Second, the signature of original intent and the material process are present and allow for the authentic editing of the art object from a 'symbolic matrix' in which the artist's hand remains present. This is further illustrated through Sol LeWitt's wall drawings. Buskirk (2003) identifies it is only a certificate and a diagrammatic set of instructions to create/install the work which are transferred. In fact, the model allows for two instances to be made at the same time in different locations while retaining authenticity. Clearly in the case of LeWitt and Rodin the art object was always intended as a physical manifestation from an analogue source. However the mechanism adopted provides a model for sanctioning post-physical print art objects. The print matrix in whatever form, digital or traditional, retains symbolic authority of the artist and provides authenticity.

Jokilehto identifies in "The Complexity of Authenticity" (Jokilehto, 2009' 125-135) that concepts of authenticity are threefold: "authenticity by creation", "historical-material authenticity" and "social-cultural authenticity". The signature of the artist and the authorisation to edition conforms to 'authenticity by creation'; the provenance and meta-data surrounding the work provide 'historical-material authenticity' and, significantly, it provides for 'social-cultural authenticity'. In this latter case what is authentic in an analogue culture may differ to what is authentic in a digital culture, just as they may do in Eastern and Western cultures for example.

Given the facility for repetition and duplication in the digitally mediated artefact, the 'original intent' or authorship and its surrounding data is more critical than the means of its production, output or instantiation when assessing the authenticity of the art object as the product of original artistic endeavour. Laidler supports this in reference to digital printmaking:

"If each part of the production process is properly documented and the information is archived, the means of establishing authenticity is readily available for museums, collectors and researchers." (Laidler, 2011')

Thus authenticity in digitally mediated printmaking, virtual or physical, is the degree of an artist's original intent in the instantiation of the art object supported by its associated meta-data and placement in its intended cultural location.

2.6.6 Summary of section: philosophical contexts of the digitally mediated art object

The philosophical tensions shown to exist³⁴ in contemporary traditional printmaking practice are amplified by digital transition(s) and post-physical practice(s). These tensions focus around concepts of 'aura' (Benjamin, 1936') and 'simulacra' (Baudrillard, 1999') and are mixed with the idea of print being perceived as a reproductive form rather than an original art form, which deflects the potential for new forms of printmaking to assume their potential.

Valéry's proposal that; technological shifts result in new conceptual approaches to matter, space and time, in the ubiquitous practice of art, continues to be valid nearly a century later. Benjamin (1936) argues that the development of printing processes separates the work of art from its uniqueness or 'aura'. This is true where the technological process is used as a tool/machine to copy and reproduce an artwork, for example a scan and subsequent gicleé print of a painting, but not perhaps of printmaking as a medium for the origination of an 'art-multiple'. Benjamin believed the opportunity that elucidation of the masses offset this loss of 'aura' in certain circumstances. This raises a significant question for the artist's own approach to printmaking: is the artwork to be limited by edition to a manufactured exclusivity or should it form an open edition for mass participation? These concepts are embroiled in considering the reproductive commercial print process against the practice of fine art printmaking, which

³⁴Revealed in the IMPACT conference series and symposia such as "Unique Reproduction - Definitions of Original Printmaking in a Digital Age" The University of Ulster 2010, and explored through the theses of Barfield (1999), Hamilton (2006), West (2009) and Laidler (2011).

has partly lead to contemporary art printmakers' tendency to the 'unique' print as a counter measure.

The new medium of "revolutionary film" (Benjamin, 1936') evolved beyond reproduction and carried its own 'aura'. Manovich suggests the digital medium should be considered as its descendant, having the same potential for uniqueness. The internet, World Wide Web, social media and digital participation (the elements of digital culture) suggest that there is a similar political dialectic context to that of Benjamin's, given the different proprietary and open-source approaches and the tensions between controlled and unregulated access. The current digitally mediated and increasingly participative (Web2.0) global social change is witnessing one of the "major historical periods" (Benjamin, 1936') with incumbent changes in "mode of being" (Ibid) and "changes in the manner of its sense of perception" (Ibid). New senses of perception hold more to concepts of "modular creativity", "remixability" (Manovich, 2005b') and "folding" (Deleuze, 2006'). In which, the digitally mediated art object carries the possibility of multiple uniqueness and its own 'aura' in the form of its "symbolic matrix" (Judovitz, 1995') or meta-data.

Digital mediation of the early decades of the 21st century has given rise to the "digital native" (Prensky, 2001' 1-6) and ubiquitous "digital culture" (Deuze, 2006' 63-75). Gere suggests the cultural origins of this lie in a variety of drivers³⁵. It is defined by (Sterling, 2005') as the 'technosocial' which may be seen equally as dystopia or utopia concurrent with the status of the viewer. This is a context in which the question of simulacra arises, Jean Baudrillard contends that "we now inhabit a world of hyperreal simulacra" (Sim and Van Loon, 2004'). Baudrillard argues that by shifting into the virtual state reality and truth are lost, for example in 'Second Life'. Although Baudrillard's views of the digital dimension as 'hyperreal simulacra' are valid, examples such as Sterling's 'Spime' and Deleuze's 'Fold' counter this.

³⁵"Cold war defence technologies, avant-garde art practice, counter-cultural techno utopianism and postmodernist critical theory" (Gere, 2002, p.201)

The material permanence of digital prints has been questioned in the traditional printmaking community. If the digital medium as a medium in its own right is accepted, composed of its own cultural context and 'aura', physical permanence becomes insignificant to its potential for variable but repeatable instancing in the manner of the "objectile" (Deleuze, 2006'). As a fluid form the Printmaking2.0 object is capable of multiple formations in the digitally mediated art object and carries the possibility of multiple uniqueness via a relative temporal model (relativistic time). In this condition the object is no longer imposed on by a "law of constancy" ..."(Deleuze, 2006') but has a "new status" (Ibid) in which "...the object no longer refers its condition to a spatial mould, in other words to a relation of form-matter, but to a temporal modulation" (Ibid), requiring an expansion in aesthetic perspective.

Questions of authenticity in printmaking tend to focus on the original print rather than reproductions. Within Printmaking 2.0 where formation of the 'print' is in-built with the possibility of multiple-uniqueness, traditional printmaking notions of authenticity no longer suffice. Given the facility for repetition and duplication in digitally mediated artefacts means the 'original intent' or authorship and related data (meta-data) is more critical than the means of its production, output or instantiation when assessing the authenticity of the art object. These are new conditions when philosophically considering the singularity of the digital evolution of digitally mediated art object. Positioning and acceptance of the digital medium may be relative to status as a digital immigrant or native. However both connoisseurship and notions of originality are being modified by the new technological methods of making artistic statements.

2.7.0 Summary of the contextual review

Figure 34: 'Populated' innovation adoption curve for digital printmaking – Thompson (2010) after Rogers (2003) [page 81] illustrates the physical and temporal parameters of digital printmaking practice which are new forms, based in digitally mediated art practice. They are the product of avant-garde and cutting edge artists applying the products of innovation in new

ways, defined as Printmaking2.0. These artists are 'innovators' and 'early adopters' in this field.

The technology of mass participation in digital mediation via networked portable devices: smart phones, tablets and e-surfaces reveal a new post-physical medium for the digital printmaker. In establishing the markers of transition between traditional and new printmaking this research hypothesises:

The emergent forms of Printmaking2.0 are "multiply produced object(s) made with a new type of template" (Kushner, 2009') and digitally mediated works are 'printed' from a 'digital matrix'. Printmaking2.0 goes beyond the mere use of digital tools for layering (visual image over visual image), to create complex meaning through meta-layering via digital mediation and pervasive networked technologies.

When digital technology is seen as a medium rather than a tool in a traditional process, there is a clear distinction between Printmaking2.0 and traditional practice. The 'print' is created through the artist's 'original intent' and mediated through technology, which permits the audience access on-demand access beyond traditional gallery space. These second generation prints are produced in multiples from new types of matrix and 'printed' using materials that are no longer bound in two dimensions or physical space, see Figure 35: Markers of transition - traditional to new printmaking practice. Printmaking2.0 (below) and this research is framed within the context of technological evolution as the mainstream of society adopts pervasive digital technologies, accessed through "new layers of meaning" (Mitchell, 2005'). These engender the evolution from 'object' to 'object 2.0' (Sterling/Marshall) into new forms of Print Art practice.

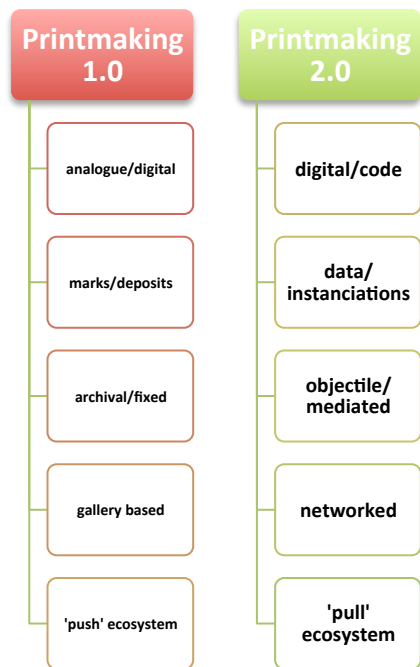


Figure 35: Markers of transition - traditional to new printmaking practice

There is a clear difference between the concepts of permanence, materiality, authenticity, authorisation and allocation in traditional and digitally mediated printmaking practice, because of the dialectic between physical and post-physical practice. Buskirk identifies that the advent of postmodernism has increasingly eroded traditional views of art that prescribe a relationship between medium, materiality and genre. Postmodern concepts of the art object and digital printmaking evoke different 'aura' and forms of materiality through replicable/transmissible art. These new forms of materiality, allocation and signature are now set against concepts of electronic distribution of the digital multiple.

The increasing groundswell of the digital medium has fostered emergent paradigms of curating and conserving the digital form. There are examples in academic and research activity since the 1990s and they are significant to this research. Suggested models are composed of physical and online manifestations. Online curation and physical manifestation allow products of Printmaking2.0 to be stored as digitally mediated art objects, curated via established international multimodal-networked systems adjunct to suitable

art museums, universities or creative commons repositories capable of their instantiation.

Developments in social networking and affinity spaces have promoted new forms of collaboration and participation. These include the creation and promotion of new affinity groupings between specialist groups, including printmakers, who are readily adopting such mechanisms. There are new forms of co-working and collaboration amongst these groups, particularly the dedicated networks established by printmakers themselves. These networks or 'virtual atelier' are akin to Read's notion of artists "working together, pooling their ideas, communicating to one another their discoveries and achievements" (Read et al., 1949') and are engendered through post-physical practice.

Concurrent with developments in curation and collaborative practice is the establishment of the on-line marketplace. This is one of the most significant developments in both commerce and digital participation in contemporary living during the early decades of the 21st century and the practice of printmaking is not exempt. The on-line marketplace provides an established e-commerce medium for direct sales galleries, co-operatives and individual printmakers, which Fitzheugh suggests may affect aesthetic judgment amongst artists. The development of e-publication and e-sales of music and literature are significant in Printmaking2.0. These sell non-material merchandise in a non-material market, opening entirely new forms of access and cultural consumerism and providing new platforms asking questions about materiality and connoisseurship. These developments are highly significant to artistic printmaking practice as they increasingly influence digital mediation in artistic practice and provide the medium for e-publication of digital fine art print and Printmaking2.0.

The philosophical tensions in printmaking practice are amplified by general concerns surrounding digital transition and post-physical practices. Philosophically these tensions focus on concepts of 'aura' (Benjamin, 1936') and 'simulacra' (Baudrillard, 1999') mixed with concerns that the 'making community' of printmaking are perceived as a reproductive form rather than an original art form. Consequently new forms of printmaking are deflected

from their potential to become projections of the artistic statement through open mediation. Just as the then new medium of “revolutionary film” (Benjamin, 1936') evolved beyond reproduction and carried its own 'aura', so the digital medium has the same potential for uniqueness. Connoisseurship and standards of originality are modified with the advent of new technological methods of making art, founded in digital mediation and increasingly participative; (Web2.0) global social change and their consequent effects on our personal identity and perceptual senses.

3.0 Methodology and data gathering

3.1 Introduction

The methodology and data gathering employed in this research is drawn from critical and contextual review. The philosophical context of the digitally mediated print art object is framed by the three 'Topoi*', emergent forms, materiality & signature and modes of consumption (as illustrated by Figure 2, p.20). The primary research enquiry was mapped to the topoi of review (see Figure 36 p.109) as:

1) Primary Research – Surveys: specifically investigating the research elements amongst peers in the international printmaking community.

Primary Research – Interviews: based on pilot studies, undertaken prior to the formal research. 'Face to Face' and telephone interviews were conducted with key personnel in print and new media workshops.

2) Research Probe 1 - Peer Practice - 'born digital - new materialities': an open source Printmaking2.0 exchange survey of contemporary 'print' developed through digital mediation for exhibition, publication and editioning.

3) Personal reflective practice expressed through research probes 2/3/4": the 'new' areas of practice identified through the contextual review and informed by the researcher's own critically engaged practice, post-physical digitally mediated printmaking.

4) Extended literature review: the additional texts generated from practice led research and contextual review.

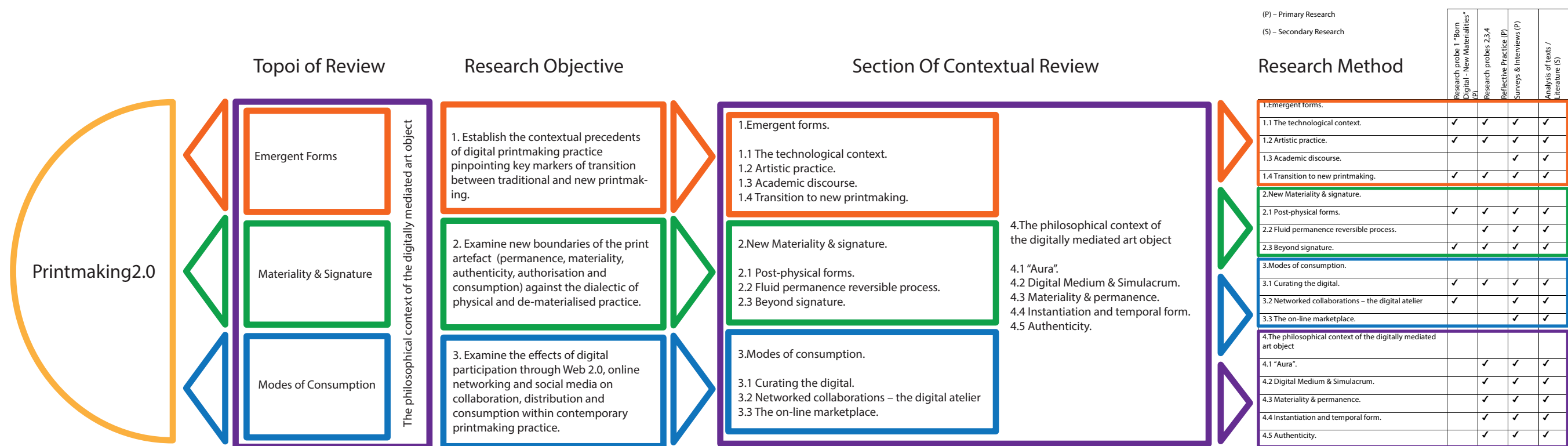


Figure 36 Map of topoi of review / research elements to primary research activities

3.2 Data generation

A number of possible proven research methods were identified and reviewed with possible methods being piloted to test their appropriateness (see APPENDIX I Qualitative Research Pilot Studies). From this it became apparent that a qualitative study of printmaker's practice, the practice of others, was necessary.

The artistic practice of the printmaking community is diverse, international and individual. "Realities exist in the form of multiple mental constructions, socially and experientially based, local and specific, dependent for their form and content on the persons who hold them" (Guba, 1990'). The researcher is embedded in this as a practitioner. Consequently the qualitative research was undertaken through participant observation in an ethnographic style of research, adopting Bryman's definition of ethnography:

"... ethnography will be taken to mean a research method in which the researcher:

- Is immersed in a social setting for an extended period of time;
- Makes regular observations of the behaviour of members of that setting;
- Listens to and engages in conversations;
- Interviews informants on issues that are not directly amenable to observation or that the ethnographer is unclear about (or indeed for other possible reasons);
- Collects documents about the group;
- Develops an understanding of the culture of the group and people's behaviour within the context of that culture;
- and writes up a detailed account of that setting.

Thus, ethnography is being taken to include participant observation and is also taken to encapsulate the notion of ethnography as a written product of ethnographic research." (Bryman, 2008')

thus tracking real world experiences and reflections of the printmaking community through open membership.

3.2.1 Qualitative research

3.2.1.1 Networks as a research tool

This research aimed to examine the cultural shifts in printmaking practice resulting from digital participation. Social media became a key mechanism of the study itself and the social networks became a research tool, facilitating the study of practitioner networks and “affinity spaces” (Davies, 2006' 217 - 234). A number of groups or 'spaces' and networks were identified for qualitative research, see Table 2 List of Printmaking Related Social/Affinity Spaces (p.56).

3.2.1.2 Qualitative data generation – pilot studies

A set of pilot studies (see APPENDIX I) based on methodological models from the researcher's 'Post Graduate Certificate – Research Methods' program (RGU) and study of 'Social Research Methods' (Bryman, 2004') and 'Doing Your Research Project : A Guide for First-Time Researcher's in Education and Social Science' (Bell, 2005') were undertaken. These studies formulated and tested appropriate methods of qualitative data gathering for the doctoral phase of the research.

3.2.2 Research probes: practice led exploration of printmaking in digital space

Critical analysis of the possible new forms of the digital matrix/digital space has been key to this research, as discussed in Review Sections 2.2.1 through to 2.2.7. The 'Taxonomy of contemporary printmaking practice' (see Figure 5 Section 2.2.1, p.24) provided the basis for the design of four practice-based research probes Figure 37 (p.115).

These research probes examined Printmaking2.0 and the new approaches to this practice from digital matrix. The probes were derived from models of “cultural probes” (Gaver et al., 1999' 21-29) and were specifically designed investigative research tools. They used the researcher's own critically engaged practice to explore specific areas of practice through projects, networks and artworks undertaken as both artistic responses and critical

investigations. The probes map directly back to research elements identified in Figure 36: Map of topoi of review/research elements to primary research activities (p.110).

3.2.3 Ethics

The research and its information related to:

- Individual human subjects: print artists, percipients, curators, educators.
- Groups: audiences, collectives.
- Organisations: ateliers/workshops, galleries, museums.

As the study was undertaken with participants/external bodies who were fully able to give informed consent, this was sought from all participants/external bodies prior to research activity taking place.

The research dealt with some information which was private or confidential. It also dealt with artistic material that is published and in the public domain, as identified in Robert Gordon University's guidance notes. So the proposed use of material was identified and informed consent was sought from all participants for the use and subsequent publication of these materials and its outputs and a set of clearly defined terms and conditions was issued to all participants (see Data CD, Research Probe 1 Digital Print Exchange a) Terms and Conditions for Digital print Exchange).

Further ethical issues not covered by the standard elements of "Research Ethics Self-Assessment", authority, ownership and artistic rights, were identified. Based on the researcher's previous professional experience, the philosophy and practice of the Creative Commons movement to the governance of the artistic rights of this work was applied. Works were licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License (<http://creativecommons.org/licenses/by-nc-sa/3.0/>).

3.2.8 Data analysis

Data analysis and correlation were used to establish commonality and divergence models. Qualitative research was contextualised against findings from the critical contextual review through evaluative process. As the data generated from the various elements of the research are diverse, visual work, peer surveys, personal practice and interviews, mixed methods of data analysis were adopted.

The visual works generated by peer practitioners form a visual ethnography and the generated images are: "sources of data in their own right" (Bryman, 2008'). Analysis of visual data was undertaken through hermeneutic analysis. The survey data generated in the peer practice elements of the research was a result of open questions to elicit each peer practitioner's perceptions, positions and practices based on the visual artworks they produced. The characteristics of photo elicitation were inherent in this data set. The data generated from the interviews of key personnel in print and new media workshops was inherently in the form of discourse, so the examination method for this data set was 'discourse analysis'.

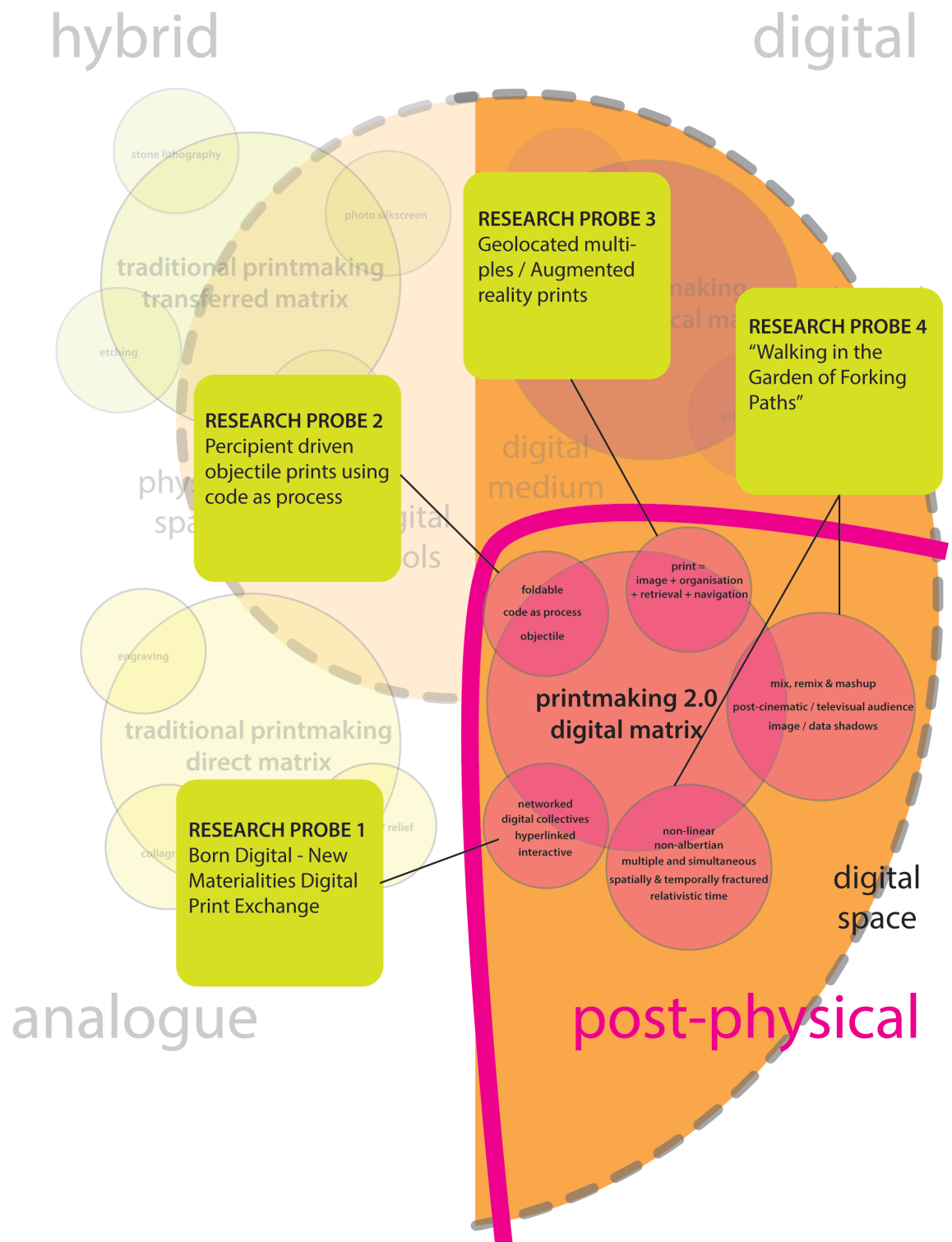


Figure 37: Map of practice based research probes examining the post-physical practice of Printmaking2.0

3.3 Qualitative research - surveys and interviews

Qualitative research was undertaken in an ethnographic style "... ethnography is being taken to include participant observation and is also taken to encapsulate the notion of ethnography as a written product of ethnographic research ..." (Bryman, 2008 p.402-403). The researcher was openly embedded as a practitioner/member of a range of printmaking communities in both physical and socially mediated digital contexts with membership of the: Edinburgh Printmakers, Printmaking Teaching Community at Forth Valley College, SGC³⁶ and the identified groups in Table 2 List of Printmaking Related Social/Affinity Spaces, p.56.

3.3.1 Objective

Examine understanding of the physical and temporal parameters of digital printmaking practice and possible markers of transition between traditional and new forms of printmaking. The enquiry also surveyed the perceptions, positions and practices of the printmaking community on the effects of digital mediation in collaboration, distribution and consumption.

3.3.2 Description

Qualitative research was undertaken through interviews and/or surveys of the participants of research probe 1 'born digital - new materialities' and selected 'major players' in studio/ateliers. (Figure 36: Map of topoi of review/research elements to primary research activities p.109).

Interviews: based on the pilot studies, interview schedules were developed from the topoi of review/research elements and were undertaken with key personnel in print studios and workshops through face to face and telephone interviews.

Surveys: custom designed survey materials were developed from the topoi of review/research elements and were specifically directed at investigating

³⁶Southern Graphics Council USA

specified research elements in: primary research, peer practice and 'born digital - new materialities'.

The Research Design, Map of Research Elements to Survey Questions and Research Design, Map of Research Elements to Interview Questions are available in APPENDIX IIIa Research Design, Map of Research Elements to Interview and Survey Questions. These detail the questions used to examine perceptions, positions and practices regarding:

- Concepts of authorisation, allocation and authenticity within digital contexts and digital permanence materiality and physicality.
- Digital working practices with particular reference to processes of digital working (states to output /instantiation).
- The co-existent relationship of traditional and digital practice.
- New models of post-physical practice fostered through artistic collaboration over time and distance, engendered through affinity spaces.

This work was undertaken using an action/reflection loop developed for this research, the data was analysed using qualitative methods. This included the product of the practice-based elements, as conceptually these outputs are "personal and social phenomena concerned with thoughts, feelings, behaviour, events, text and artworks" (McDuff, 2010').

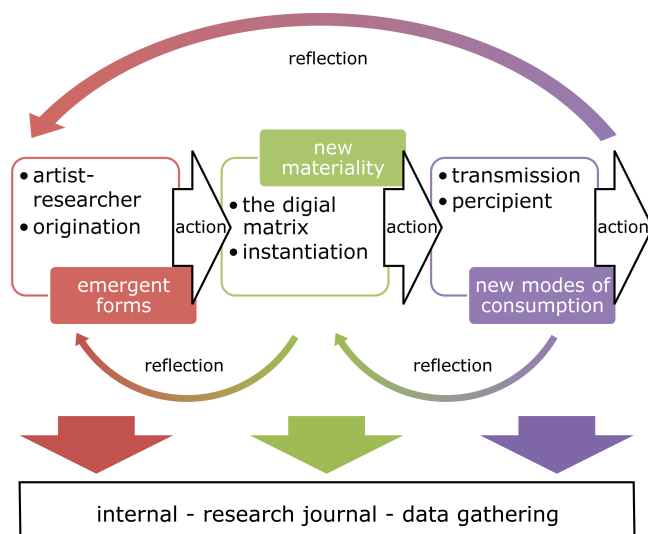


Figure 38 The action/reflection loop

3.3.3 Sampling

As the qualitative research undertaken was conducted in an ethnographic style, the sampling methods for the surveys and interviews conducted were based on concepts of “purposive sampling” (Bryman, 2008'). Specific reference to the interviews with key personnel in print and new media workshops was undertaken “... in a strategic way, so that those sampled are relevant to the research questions that are being posed” (Ibid). The survey of peer practitioners was undertaken in adjunct to the Primary Research Probe, peer practice ‘born digital - new materialities’ was by nature a “snowball sample” (Ibid) where the “researcher makes initial contact with a small group of people who are relevant to the research topic and then uses these to establish contacts with others”(Bryman, 2008').

3.4 Research probes

Critical contextual review, direct qualitative and practice-based research forms the three research methods of the ‘dynamic triangulation’³⁷ in this research. Based on review and analysis of practice based research methodologies, the ‘research probe’ was adapted and developed from ‘cultural probes’ developed by Bill Gaver (et.al). Research probes design purposeful practice explorations to investigate specific questions developed from the research aim, objectives and topoi of review.

Research Probe 1 explores concepts of the post-physical print and current contemporary digitally mediated printmaking practice. Research Probe 2 investigates the use of code as a process in the production of foldable, objectile print forms in digital space. Research Probe 3 explores post-physical print with specific reference to digital augmentation and virtual layering of prints on physical surfaces. Research Probe 4 investigates post-physical printmaking in the context of “digital space” (Kilian, 2000) and is founded in the imprinting of digital space onto physical space. Overall the adoption of this methodology is significant in placing this research in the domain of practice-based artistic research and contributing these artistic

³⁷The three elements dynamically interact with each other in the design, process and propagation of the research.

outputs to knowledge, as well as the research's philosophical and contextual contributions.

3.4.1 Research Probe 1: "born digital – new materialities" digital print exchange

3.4.1.1 Objective

To examine Research objectives 1,2 and 3, this Probe was structured as a digitally mediated participatory and collaborative open source print exchange. The establishment of a networked digital collective invited interactive digital participation (Web2.0, online networking and social media) which explored:

- Collaborative practice in a digital collective established through networked activity in digital space.
- A comparison between a digital portfolio resident in digital space with networked access and its potential for localised physical instancing.
- Peer practice in indicating markers of transition between traditional and new forms of printmaking, within the context of physical and temporal parameters of digital printmaking practice.

The print exchange acted as a vehicle for the delivery and collection of qualitative survey data (as defined in Section 3.3 Qualitative Research - Surveys and Interviews) via the print submission documentation.

3.4.1.2 Description

Based on invitation and an open call for the contribution of 'born digital' works, participants included established practitioners and 'citizen practitioner'(s) (Schön, 1983') were invited to author, submit and exchange digitally mediated print works to an open source online repository, represented in the format of a continuous online and physical exposition (October 2012 – February 2013).

The works composed digitally mediated prints originated by participants, who were asked to provide a high-resolution digital image(s) (20cm² maximum 10cm²minimum @ 300 p.p.i.)

Participants were also asked to complete a submission/consignment form/questionnaire, which incorporated a structure for gathering a base meta-data set from participants including:

Artist's background: for example: biography, artist's statement, curriculum vitae, rationale, related works, digital ethos, directions, skills.

Positional statement on the adoption of technology: the participant could express their thoughts, be they for the potential of new mediums or their worries and/or fears about them. Participants were also asked to place themselves on a scale derived from the "innovation adoption curve for digital printmaking" (Thompson, 2010 after Rogers, 1962) see Appendix 1.

Artistic context of the artwork: context, locations, source materials, etc.

Process inputs: concerning digital origination of the image

Process outputs: information required for the instantiation/editing of work.

The digital prints submitted were composed of both image and meta-data providing the opportunity to examine the potential of extended contexts in digitally mediated print. Networked collaborative practice was employed to:

- Curate the exposition
- Edition prints to both physical and/or electronic surfaces.
- Return the exchange portfolio to participants in digital form.
- Maintain a dialogue with the participants

Follow up surveys were undertaken with participants as a primary research mechanism, to further ascertain their perceptions and positions in relation to their practice in the context of:

1. New materiality and signature.
2. Modes of consumption.
3. Emergent forms.
4. The philosophical context of the digitally mediated art object.

On completion of this research all participants were given the opportunity to download (under creative commons 3.0 license) a copy of the digital portfolio generated from this study.

3.4.1.3 Rationale

This research probe was used as a primary research tool to examine peer practice. The 'born digital - new materialities' folio examined each of the Research Objectives 1, 2 and 3, whilst located primarily in the exchange and exhibition³⁸ of prints made through digital mediation.

This research activity examined the physical and temporal parameters of digitally mediated printmaking, facilitated through networking and post-physical practice. It explored notions of permanence, materiality, authenticity, authorisation and allocation in this post-physical context.

Participation was engendered via Web2.0, online networking and social media to support collaboration, distribution and consumption of the products of contemporary digital printmaking practice. The research examined new questions of materiality set against concepts of electronic consumption of Printmaking2.0 objects, where new questions of allocation and signature have arisen in the electronic distribution of the digital mediated multiple.

³⁸ The on-line exhibition was facilitated through <https://openair.rgu.ac.uk/bitstream/10059/776/3/Born%20Digital%20New%20Materialities%20ePortfolio%20ReleaseV1.pdf>
The physical exhibition of the portfolio was facilitated as part of "Probes" (An exposition of exploration of post-physical printmaking in digital space through data sourcing.) Georgina Scott Sutherland Library, Robert Gordon University, Aberdeen, November 2012–February 2013

3.4.1.4 Sampling

The invitation/call papers or brief were extended through private and public networks and affinity spaces and were supported through a dedicated web site, containing additional materials and illustrations, the following comprises the copy:

"BORN DIGITAL – NEW MATERIALITIES" - a survey mini-print exhibition of contemporary 'print' developed through digital mediation for digital publication and editioning.

"When an object is created in digital form, we describe it as being 'Born Digital'." (The-Library-of-Congress, 2010'). Whilst as creative practitioners we are increasingly utilising technologies, which are engendering new conceptions and aesthetics – "new materiality".

you are asked to make and submit "born digital" print art, which responds to and or reflects upon these conditions.

Prints should be measure between 100 cm² to 400 cm² and submitted as digital files in a common format (pdf, jpeg, png, tiff) to the following specifications:

- Resolution: 300 dpi
- Colour Model: RGB
- RGB Profile: sRGB IEC 1966-2.1

Please do not send any physical prints or submit scans/reproductions of works produced by traditional means.

This project is part of research being undertaken by Paul Thompson at Grays School of Art – Robert Gordon University. It is founded on questions raised through the researcher's professional activities, of printmaking practice and teaching activities in Contemporary Art Practice. For further details of the project visit:

http://www.printmaking2-0.info/about_research.html

3.4.2 Research probe 2 - code as process: explorations of temporality.

3.4.2.1 Objective

Designed to examine elements from both Objective 1 and 2 this probe explored using code as process to produce 'objectile print' forms in digital space. It was concerned with the instantiation of Printmaking2.0 objects to 'digital surfaces' as a manifestation of non-physical instantiation, which in this sense should be considered as 'Deleuzian' objectile constructs.

3.4.2.2 Description

Ideas surrounding printmaking in digital space were explored. A context in which we are no longer restricted to a single temporally fixed image, the artist is afforded the potential as Friedberg identifies to see the world through "virtual windows" (Friedberg, 2009') that are "multiple and simultaneous" (Ibid) rather than "singular and sequential" (Ibid).

Coding was used, in the form of the computer language 'processing'³⁹, Adobe 'Flash' and 'Actionscript'. This established a digital print matrix that exploited both coded temporal interactive image generations and concepts of the "Mashup" as defined by Sonvilla-Weiss. In a "Mashup" elements are drawn from various digital sources, akin to image assemblage in analogue printmaking.

3.4.2.3 Rationale

The opportunity exists to imprint from a digital matrix to new or alternative surfaces (for example touchscreens, thin film and projection) to those of traditional printmaking (paper, fabric or wood). This affords the potential for fluid, temporal engagement and re-engagement with the art object within

³⁹The processing language was developed by Casey Reas and Ben Fry @ MIT and provides an open source coding language for artists.

“the personalised surface” (Coldwell and Rauch, 2009') and consequent “artistic approach(es) to printmaking” (Ibid)

These experiments in digitally editioning original print from 'digital matrix' to 'digital surface' no longer rely on physical materials/surfaces and provide the conditions for asking questions about the post-physical or “paperless print” (Thompson, 2009a'). The probe is based on Corcoran's premise that engagement with the art object in the digital medium shifts from physical to temporal. It is thus set in the context of time through which the potential for engaging and re-engaging with the art object provides a condition of 'fluid permanence'. Each engagement then constitutes an instance or instantiation, which, as Drucker identifies, “is the manifestation into substance, the instantiation of form into matter that allows some-thing, anything, to be available to sentience” (Drucker, J, 2001).

3.4.3 Research probe 3 – the print as portal: augmented reality optical/image tracking experiments.

3.4.3.1 Objective

Responding to Research Objective 1 this Probe was designed to explore concepts of the post-physical print and its constitution as image + storage + organisation + retrieval + navigation.

3.4.3.2 Description

The application of practice within the digital matrix through augmented reality platforms 'layar' (www.layar.com) and/or 'junaio' (www.junaio.com) to explore the potential of Printmaking2.0 through marker-less/marker based augmented reality and location based tracking.

Examining the context beyond the physical presence of the prints, different 'Aura' and forms of materiality are manifest through replicable/transmissible art which may embody different concepts of the 'material' as sensory perceptions of the art object/process.

3.4.3.3 Rationale

A contributing artist to the 'born digital – new materialities' digital print exchange identified:

"I think mobile devices will start (to) impact print soon perhaps they already are and I just don't know it. Augmented reality as well I'm sure it's already worked its way into print conceptually, just not sure how it's going to happen physically." (Freeman, H D, 2011).

This response suggests the potential for this area of research. Potentially augmented reality, Printmaking2.0 presents the opportunity to make digitally mediated prints, which through augmented reality optical/image tracking affords the possibility of the physical print acting as a portal to engagement in digital space.

3.4.4 Research probe 4 – 'Walking in the Garden of Forking Paths': augmented reality geolocated multiples, exploring conceptions of indexicality in digital and virtual space.

3.4.4.1 Objective

This probe was designed (in response to Objective 1 and elements of Objective 2) to investigate post-physical printmaking in the context of the 'digital matrix'. These probes are founded in "digital space" (Kilian, 2000' 118) and the researcher explored notions of non-albertian, multiple and simultaneous digital post-physical print forms via mix, remix and mashup.

3.4.4.2 Description

'Walking in the Garden of Forking Paths' is a practice-based research project in post-physical printmaking exploring ideas formed from critical analysis of the possible forms of Printmaking2.0/digital matrix/digital space model (see Section 2.2 Printmaking2.0 - The digital matrix: philosophy and context, Section 2.2.4 The digital matrix and digital space, Section 2.2.5 temporality and the digital matrix and 2.2.6 non-albertian space and multiple viewing planes. Expressing the artistic intention and acquired knowledge of the artist/researcher through digitally mediated, post-physical print practice

founded in the aesthetics of “post-cinematic/televisual audiences” (Manovich).

The ‘digital matrix’ forms the space of collected information ‘for’, ‘by’ and ‘about’ the post-physical printmaker, a conceptual “Wunderkammer” (Büscher et al., 1999’ 1-17) resident in a digital layer as conceived by Ciolfi⁴⁰, which frames the multiple and interlinked digitally mediated ‘prints’ from Printmaking2.0.

3.4.4.3 Rationale

Ideas developed by Jorge Luis Borges⁴¹ and expanded by Peter Morville⁴². ‘Walking in the Garden of Forking Paths’ is a series of spatially and temporally fractured artistic constructs formed through post-physical printmaking. It is the artist’s response to the landscape of digital space and references is derived from virtual engagements, experiential journeys and intervention generated from the image and data shadows of the digital landscape.

These digital mediations aim to examine the boundaries of temporal constructs in a non-linear, relativistic time model, allocating significance and mechanism to the philosophy and process of digital layering. Forming image space of collected information or digital “Wunderkammer” (Ibid) where individual portals are created from digital layers framing the multiple and interlinked digitally mediated ‘prints’ formed by Printmaking2.0.

⁴⁰ CIOLFI, L. 2011. Augmented Places: Exploring human experience of technology at the boundary between physical and digital worlds. In: JAMES-CHAKRABORTY, K. & STRUMPER-KROBB, S. (eds.) Crossing Borders: Space Beyond Disciplines. Bern: Peter Lang.

⁴¹BORGES, J. L. 2000. *Labyrinths : Selected Short Stories and Other Writings*, London, Penguin.

⁴²MORVILLE, P. 2011. *A Garden of Forking Paths* [Online]. Silver Spring Available: <http://www.asis.org/Bulletin/Feb-06/morville.html> [Accessed 16th September 2011].

4.0 Results

4.1 Qualitative Research – surveys and interviews

Surveys and interviews were conducted amongst peer practitioners and key stakeholders in the Scottish Print Studios and Workshops in Section 3.0 Methodology and data gathering. The survey questionnaires and interview schedule design was based on the topoi of review and their research elements (see Figure 4: Map of Topoi of Review against Research Objectives and Sections of Contextual Review p.22)

4.1.1 Surveys

Data gathering surveys were undertaken amongst peer practitioners. All submitting artists were asked to complete a basic survey as part of the submission process for Research Probe 1: 'born digital – new materialities' digital print exchange. Participants were invited to complete the extended survey developed from the topoi of review/research elements once the submission process was completed. The extended survey questionnaire was composed of 38 questions in 4 sections, which corresponded to the 15 identified research elements (see APPENDIX IIa Research Design, map of research elements to survey questions). This produced a 35.6% response rate from 17 of the 49 submitting artists.

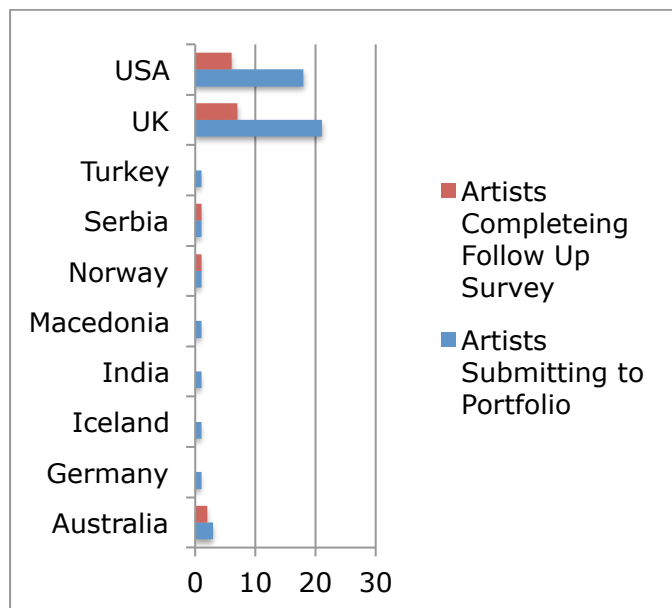


Figure 39: Ratio of submitting artists completing extended survey

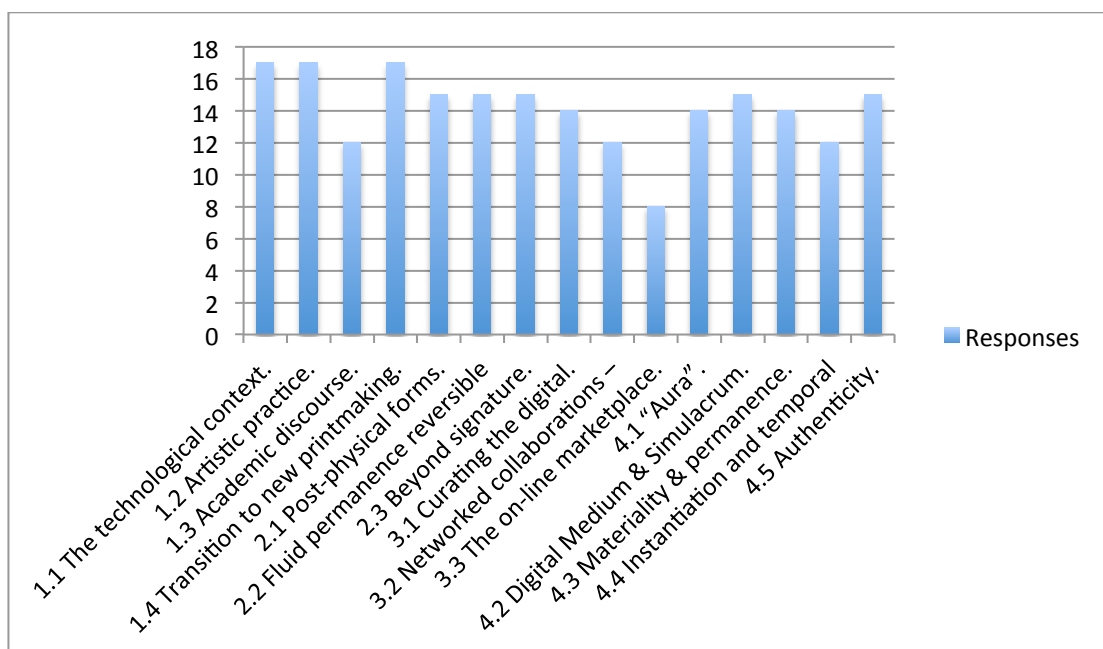


Figure 40: Number of responses per research element from submitted survey responses

Responses to the survey revealed the distribution pattern illustrated in Figure 40 above, a complete set of responses is provided as the "Extracted responses from extended artist surveys" in APPENDIX IIc, Extracted responses from extended artist surveys. The following résumé is based on these findings.

4.1.1.1. Emergent Forms (Research Objective 1)

The first group of questions 1.1–1.4 related to 'Emergent Forms' (Research Element 2.5); initially exploring the artist's relationship with digital technology, their definition of it and their use of these technologies in printmaking and non-printmaking activities.

4.1.1.1.1. The Technological Context

Questions on The Technological Context (technology and you) elicited a range of opinion, ranging from a focus on the digital processes alone to a concentration on digital technology being used as a 'painting' process. Print was only one of a range of possible outputs, to a predominance of the use of digital technology as an embedded tool in the production of prints through traditional means. One artist identified:

"The computer is my primary tool for creating both still and time-based art, the repository of my archives and database information and my means of communicating with the world". (Respondent-15, 2011')

Another offered:

"I actually got into traditional printmaking via digital technologies ... it was through creating digital prints that I began to experiment creating hand-made works for scanning and re-configuration in with digital tools". (Respondent-13, 2011')

4.1.1.1.2. Artistic Practice

With reference to 'artistic practice' the artists identified: a general excitement in connection with the opportunities digital technology offer for experimentation, innovation and the dynamism in digital working processes.

One of the artists summed this up:

"I am inspired by the many innovative and varied applications of digital media in contemporary art, I think it opens up new possibilities in traditional mediums. I think printmakers have always adapted to new technologies to push the medium". (Respondent-17, 2011')

Another respondent identified that in their printmaking practice they:

"... go back and forth between creating works digitally, printing them out, reworking them by hand, scanning them back into the computer and then repeating the process multiple times. But I also often submit my works for exhibition online and I haven't sent out slides in over two years. I maintain blogs for some of my projects and primarily use my portfolio website for soliciting exhibitions."(Respondent-13, 2011')

4.1.1.1.3. Academic Discourse

Questions on 'academic discourse' (illustrated in Figure 40 p.128) received noticeably lower responses, with one respondent identifying they tend to disregard academic discourse. Another said: "I've attended several academic conferences, one recently in Belfast on terminology, which I got very little from ..." (Respondent-9, 2011').

Respondent-12 believed: "The discussions have not directly affected me so much as they have reiterated realisations I have experienced in my practice. Theory seems to follow from practice for me." (Respondent-12, 2011')

Another artist observed,

"It's an on-going dialogue. The widening parameters of what is considered 'printmaking' is probably the most notable of all the things I discuss with my peers." (Respondent-16, 2011')

4.1.1.1.4. Transition to New Forms of Printmaking

In response to 'New forms of printmaking' artists reported differing ranges in the balance between digital and traditional methods spanning 85%/15% (Respondent-5, 2011'), through 50%/50% (Respondent-2, 2011' , Respondent-1, 2011') to "I only work digital, all the way" (Respondent-3, 2011'). Questions on the transition from traditional to digital printmaking and the directions it may take led one respondent to identify that:

"New combinations of tactile and digital means are only just starting. I could imagine projections combined with printed surfaces, digital print installations that are presented simultaneously in various locations, etc. Trans-global exchanges are beginning also." (Respondent-12, 2011')

Significantly for this research Respondent-13 thought:

"... mobile devices will start impact print soon ... perhaps they already are and I just don't know it. Augmented reality as well ... I'm sure it's already worked it's way into print conceptually, just not sure how it's going to happen physically." (Respondent-13, 2011')

4.1.1.2. New Materiality and Signature (Research Objective 2)

The second set of survey questions 2.1-2.3 focused on the artist's thoughts on possible forms of new materiality and signature in digital printmaking practice.

4.1.1.2.1. Post Physical Forms

There was a general consensus as to the validity of digital evolutions, including public and private screen based systems and ePublications. Citing: "It might mean exciting venues for artists whose work reads well in these contexts" (Respondent-12, 2011') and:

"I often ask myself if the role of the printed image is vanishing. More and more digital screens are popping up on all arenas; at the waiting rooms of dentists, doctors, at shopping centres, in the lounges of hotels, places that a few years back, might of displayed graphic art ..."
(Respondent-3, 2011')

Respondent-1, generally tempered this acceptance with the view that the new technologies would "'add value' to the experience of the traditional object in a new dimension" (Respondent-1, 2011'). Respondent-16 was clear that "... notions of craft will disappear only to materialize again when the culture bemoans the disappearance of the object" (Respondent-16, 2011') but believed that "... we can reach a much larger audience on the Internet" (Ibid).

Respondent-6 saw opportunities for the artist to "... easily create, publish and distribute virtual collections of works, artists books and catalogues." (Respondent-6, 2011'). Specifically in terms of the implications of ePublication, another offered:

"eBooks can become both more and less than physical books. The ability to continuously scroll, have unlimited virtual space and embed links and video add a level of richness achieved no other way."
(Respondent-15, 2011')

4.1.1.2.2. Fluid Permanence – Reversible Process

With the 'Fluid Permanence and Reversible Process' the respondents were positive about the potential for the artist to have, through the digital medium, the potential for reversible process and thus fluid permanence in their work. Most said they were doing this in some form or other, Respondent-3 identified: "I use all these possibilities. Sometimes I think I am finished with an image, but then I can rework it" and "... I'm so

embedded in them ... I have no sense of practice without them” (Respondent-13, 2011'). Respondent-10 added the caveat “if the artist is the driver then we might have a new experience of value, if in effect the software is the creator then we reduce ourselves.”

Respondent-2 was clear these possibilities were:

“... useful in the design of finished pieces, but a finished piece is a finished piece. If you go back to a piece and change it, then this becomes a new work in it's own right, and the original work becomes state of the current piece. It's about process. This is not just limited to digital works but also to traditionally produced pieces” (Respondent-2, 2011')

Respondent-5 worried that this “could also be a code for ‘dithering’ – a refusal to commit”, although Respondent-12 saw greater potential for these possibilities citing:

“The implications are to raise the bar for a standard of excellence and expression, since every possible artistic decision is now infinitely available within this medium! The artist even has to decide whether the image or work will exist in a single, final, “best” iteration, or whether its point is better made in versions or transformations. This is exciting new territory. I use all these techniques, and feel that digital work is very challenging, but it offers powerful new expressions.” (Respondent-12, 2011')

4.1.1.2.3. *Beyond Signature*

The artists offered interesting responses to notions and application of ‘signature’. Some of the artists were strongly against signature in any form “I hate signing my work, I would rather not have to” (Respondent-8, 2011') and Respondent-5 suggested:

“Concepts of the ‘original’ and ‘originality’ may have more to do with the commercialisation of art. The ‘signature’ ensures the monetary value of a piece of work. I’ve noticed that for some reason Neolithic cave paintings are generally unsigned.” (Respondent-5, 2011')

There was a view that galleries like “work to be signed and given an edition number” (Respondent-11, 2011') and that:

“People are reassured by the presence of a signature, implying the presence and approval of the artist. It seems necessary and will probably prevail.” (Respondent-6, 2011')

A number of artists offered suggestions as to how new forms of signature may be applied in digital print. Respondent-12 provided a substantial answer, which encapsulated the ideas and concepts expressed by a number of the respondents:

“Digital prints can always be limited, signed, and numbered by the artist and files destroyed. This is a practice that requires much self-discipline and is not as often practised for digital works as for traditional ones. Print-on-demand is something new. Accepted practice for traditional prints took a long time to settle in, as will these new methods. Files are a different story as access is more difficult to control, but they can be digitally marked or have a signature embedded. I think we need to establish accepted practices, and then teach them. For now, I am holding to limited editions of digital prints, and avoiding print-on-demand practices. If there were a secure and permanent way to “sign” downloaded prints or files it would change my approach. In the US, we have an automatic copyright when certain information is included.” (Respondent-12, 2011')

Referring to ideas of ‘digital signature’ it was suggested that “maybe the info could be embedded in the file info” (Respondent-17, 2011') and “... perhaps we will treat images like Apple treats songs on iTunes.” (Respondent-16, 2011'). Respondent-13 offered:

“... perhaps something embedded in the code of the image file, but that would also require that the viewer/taker of the image could also readily access that code.”

4.1.1.3. Modes of Consumption (Research Objective 3)

The third set of survey questions 3.1-3.3 were concerned with modes of consumption.

4.1.1.3.1. Curating the Digital

In reference to curation, collaboration and the on-line marketplace. Responses were diverse with one respondent providing a categorical negative as to their involvement. Other respondents offered varying degrees of positive responses.

Respondent-9 offered:

"The medium provides a very user-friendly interface via computer; the printing methods are largely consistent from city to city, as are costs. So one is able to curate with a good idea of what can be achieved and produced. No surprises arriving in the crate."

(Respondent-9, 2011')

Another artist responded: "Yes - a print exchange and sale at the University of Kentucky - We sold out" (Respondent-13, 2011') and Respondent-17 offered "slide-room seems to be common these days for digital submissions of artwork. Great, a lot easier to sending a CD, you can upload instantly". (Respondent-17, 2011').

In response to questions on curation the artists tended to veer towards answers about collaborative working, for example: "Yes - Digital printing for a collaboration with Polish artists, exhibited in Tallinn" (Respondent-9, 2011'), "... (using) Skype, Internet file posting, email, PayPal for expenses, U.S. Mail, etc. I recently made a collaborative digital print with an artist in Iceland where neither of us left our studios [I am in Boston]" (Respondent-12, 2011').

4.1.1.3.2. Networked Collaborations

Subsequent questions exploring to what extent the artists got involved in digitally networked collaborations through the internet e.g. Inkteraction, Print Universe, Facebook etc. revealed a range of responses. Respondent-3 had "never been in networked collaborations, I work solo ... I am on Facebook and find out about exhibition opportunities via the net" (Respondent-3, 2011'), while Respondent-16 used the internet to

collaborate with “artists in Australia, Brazil, and Cuba after a conference in Cuba ... with some faculty and advanced students at Woodbury College in Los Angeles and ... at UNC Charlotte”.

Respondent-9 said such collaborations through the internet “... raise opportunities, it’s a welcome aid for exchanging opinion, getting help on developments, ethical issues and seeing artist’s works in divergent countries” (Respondent-9, 2011'), they went on to state that they “readily support this kind of initiative” (Ibid). Overall there was a general consensus that information exchange and discussion was the primary form of collaboration undertaken.

4.1.1.3.3. *The Online Marketplace*

In the Modes of Consumption section the respondents were surveyed on their involvement in the online marketplace. The results were significant in that this area elicited the fewest responses from the artists. Their responses were generally negative, with the exception of Respondent-3 who was “considering using a site in Norway for artists and craftsmen to sell their work” (Respondent-3, 2011'). The remainder either did not sell at all in this manner or had limited results and Respondent-16 said they did “... some years back, but only sold a few and the packaging and admin was quite a bind”. (Respondent-11, 2011')

4.1.1.4. *The Philosophical Context of the Digitally Mediated Art Object (All Research Objectives)*

The final series of questions were concerned with the philosophical context of digitally mediated printmaking, with specific exploration of ‘aura’ (aesthetics and connoisseurship), production and re-production, permanence, instantiation and temporal form (print on-demand) and authenticity.

The respondents were clear on the separation between reproduction and printmaking, digital or traditional. Respondent-1 differentiated between digital and traditional “traditional prints made using a press as in an etching

press, screen bed, by hand (rubblings), etc. Digital: screen, inkjet, projection, installation, etc.” (Respondent-1, 2011'). Respondent-10 also offered a distinction:

“Traditional printmaking has drawing and painting values to the fore whilst the digital printmaking so far has an insatiable appetite for photography based imagery. This is a new form which may be 'hiding' its aura from us”. (Respondent-10, 2011')

Respondent-3 identified: “it is just two different technologies. It is not the technology but the artist, and what he/she wants to express.” (Respondent-3, 2011')

4.1.1.4.1. 'Aura'

Further responses revealed a divergence of opinion on the concept of 'aura'. Respondent-13 offered: “I think he (Benjamin) might have been confusing 'aura' with craft and tactility” and Respondent-16 thought:

“Benjamin was from a different time when these ideas of reproduction were less integrated into the fabric of culture. I hope that one of the positives of digital media is that we have revised this notion of 'aura' and perhaps tossed it aside altogether.” (Respondent-16, 2011')

Another respondent offered: “Walter Benjamin describes the loss of the “hand” but the hand can work in different ways in the computer, it's just another tool that artists use.” (Respondent-17, 2011')

4.1.1.4.2. Digital Medium and Simulacrum

Overall the responses clearly voiced strong concern as to the perceptions of the quality and ambience of traditional and digital printmaking, which encompassed concepts of differing 'aura' and Respondent-5 identified:

"The key word is "reproduction" – if a work is reproduced it must lose an aura of "originality". The production of "original" multiples may be different. A work of art might only have an 'aura' created by the myth surrounding the "genius" of the originator." (Respondent-5, 2011')

Responses to questions on production and re-production focussed on further opinion surrounding re-production rather than production. However Respondent-9 suggested: "Multiplicity is one of the elements of printmaking that I admire; its democratic nature is part of my practice and one facet I look to exploit" (Respondent-9, 2011'). Respondent-7 believed human nature is a limiting factor as "it would be really boring to keep producing minor variations on the same thing. Respondent-17 offered:

"the matrix (digital code) can not get worn down like it would in a traditional process. This means you could have the exact same result every time. It's fascinating. Of course due to difference in printers it will never be printed exactly the same. Perfection is the signature of the computer." (Respondent-17, 2011')

Respondent-5 believed there to be "no reason why this should be a bad thing but, (rightly or wrongly) what value will we place on the resulting images?" (Respondent-5, 2011').

4.1.1.4.3. *Materiality and Permanence*

Exploration of the artists' perceptions on materiality and permanence tended to focus on the question of permanence, with clear divergence apparent.

It was cited: "it appears that permanence issues have been resolved and that this is no longer a valid criticism. This, as with all inks, is based on trust. Time will tell." (Respondent-6, 2011') Respondent-3 believed: "they are probably still valid. Maybe one has to think re-make. You do not only buy a print, but maybe a license to a print. So, if the print diminishes in say- 10 years, or whatever – then the buyer is entitled to a re-print. (Respondent-3, 2011').

Respondent-11 believed “criticism came from printmakers, art schools and galleries marketing ‘fine art’ prints” (Respondent-11, 2011') and that “... they all had a vested interest in discrediting this fabulous new medium” (Ibid). Respondent-11 offered commentary which touched both permanence and ‘Aura’. “When I am excited by a ‘print’ I see in an exhibition, I don’t give much thought to the actual medium. If it’s a Picasso, which it often is, well, I don’t think of him as primarily a printmaker, though of course he took a lot of trouble over it” (Ibid).

4.1.1.4.4. *Instantiation and Temporal Form*

Questions on instantiation and temporal form or print on-demand also elicited a range of responses. “In a purely practical sense this is welcome, but it does pose difficulties if a printer, operator, or matching paper and inks are no longer available to complete a full edition years later.” (Respondent-10, 2011')

Respondent-6 identified:

“allowing the purchaser to download and print the image themselves, removes a large element of quality control from the artist. I would be very wary of using this myself. If the purchaser orders a print from the artist (print on demand) then this offers the benefit of opening up flexibility for artists wishing to create larger bodies of work and then print-on-demand.” (Respondent-6, 2011')

This view was supported by Respondent-16, who said: “It’s possible and already utilized on websites such as Deviant Art. I would think it produces an inferior product when printed by the buyer as they often have no understanding of printmaking, papers, colour balancing, etc.” In terms of the artists’ use of printing part editions, much as some etchers have traditionally done. Respondent-16 also said: “I keep many of my digital prints in a virtual state until I either need to sell them or exhibit them in a gallery” and Respondent-13 identified that they did this “... quite a lot. I only print works, as I need them to save on resources and materials.” Respondent-12 however was clear that “I choose to print limited editions of my digital work, all at once. Not all digital prints are created equal and the

results and settings of various printers fluctuate wildly.” (Respondent-12, 2011')

4.1.1.4.5. Authenticity

The last set of questions focussed on concepts of authenticity with Respondent-9 clearly identifying:

“Authenticity is the act of concept, whether the artist has any hand in the making or the finishing of the piece doesn’t matter. The fetishistic nature of printmakers and their material and technical procedure, are at odds with this.” (Respondent-9, 2011')

Similarly Respondent-5 suggested: “A fixation with such terms as ‘authenticity’ and ‘originality’ may detract us from issues that should concern us as artists”; Respondent-12 believed: “authenticity indicates a close link to the originator. Conversely as regards broad distribution, an artist’s ability to standardize an image for such distribution.”

One artist put it as simply as: “I think it’s us who needs to change our thinking about that. I make digital prints and they are authentic 😊” (Respondent-17, 2011') and Respondent-2 thought “that authenticity is a word that shouldn’t be used in the digital context -Just the fact that they exist”.

Another artist saw the significance of authenticity being in the commercial reception of works: “The question of numbering and durability is relevant if I wish to sell to a ‘serious’ art-market. Traditional collectors of art, who are interested in prints as an investment, might question these things and are perhaps significant for setting a price tag for the print.” (Respondent-3, 2011')

4.1.2 Interviews

Interviews were undertaken with key personnel at the six Scottish Print Workshops⁴³ during the period January–May 2011 to survey the views of this printmaking community on permanence, materiality, authenticity, authorisation, allocation and the effects of digital mediation on collaboration, distribution and consumption. Interviews were digitally recorded and transcribed, with collated and extracted responses presented in APPENDIX IIIb. The extended survey questionnaire was composed of 42 questions in 4 sections, which corresponded to the identified research elements (see APPENDIX IIIa Research Design, map of research elements to Interview and Survey questions). Findings from interviews form the basis of the following résumé of perceptions, positions and practices in the sampled organisations.

4.1.2.1. Emergent Forms (Research Objective 1)

4.1.2.1.1. The Technological Context

All the interviewees confirmed they used digital technology in their day-to-day organisation, there was recognition amongst the Glasgow, Edinburgh and Dundee workshops of the potential to extend and expand contexts of new technologies for example:

“We’re about to undertake a big change to our internal back office finances and administration. We’re having an integrated database that’s going to link with our finances and feed our website, it’ll provide all the content directly to the website so it links our database with prints and people and everything.” (Edinburgh-Printmakers, 2011’)

However the extent of adoption ranged from these ‘innovators’ and ‘early adopters’ through to the ‘late adopters’ who identified:

“The workshop as a body; uses it (the digital) extensively in it’s administration. (But) we don’t actually particularly use it in production of prints, we’ve got a very old computer and we’re not connected to the internet.” (Fife&Dunfermline-Print-Studio, 2011’)

⁴³Edinburgh, Glasgow, Fife & Dunfermline, Dundee, Peacock (Aberdeen) and Highland (Inverness)

4.1.2.1.2. Artistic Practice

Given the context and activities of the workshops, all the interviewees were more focussed on the uses of digital methods in the context of artistic practice.

At a basic level all interviewees identified that members were using software as a digital tool: "digital technologies mainly as a 'step' in another print process" (Peacock-Print-Studio, 2011') and the digital suite is a tool that could be used throughout the studio (Highland-Print-Studio, 2011') for example at Glasgow making "film on the machine - acetate, which we supply to silkscreen printers and photo etchers" (Glasgow-Print-Studio, 2011').

Significantly there were "artists coming and purely making work, which will be printed in large format on fine art paper" (Glasgow-Print-Studio, 2011') using typical software, "photoshop, illustrator, painter, to originate or manipulate drawings, photographs" (DCA-Print-Studio, 2011') in the production of "digital print as an end form, that's something that's really increased in the last year. I think people are realising you can do (and), they can rely on what kind of standard's coming out so it's really grown" (Edinburgh-Printmakers, 2011'). This was also reflected by Dundee who identified a range of approaches where some artists are trying to: "mimic drawn imagery" (DCA-Print-Studio, 2011') whilst others, and pertinent to this research, are: "exploiting the digital qualities, mechanical half-tones, vector-drawings, algorithms things that show the language of digital work" (Ibid).

In Glasgow there is evidence of "artists using technology touchscreens and projections in exhibitions a lot more" (Glasgow-Print-Studio, 2011'). Although workshops such as Dundee, Glasgow and Edinburgh identified a clear understanding of emergent forms of practice from these developing digital practices, innovative practice in a more hybrid context was suggested by work at Highland, using technology to take lino cut through Photoshop, manipulate it and print it "large, really large, in some cases five metres" (Highland-Print-Studio, 2011'). However there also remains an aim

“to embrace tradition, innovation and experimentation” (Peacock-Print-Studio, 2011') with continued focus on traditional practices (Fife and Dunfermline) and any innovations coming as part of individual practice were still the norm.

4.1.2.1.3. Academic Discourse

When questioned about the impact of academic discourse the interviewees primarily cited that they didn't think academic discourse had a direct impact on studio activities or how they “think about these things” (Edinburgh-Printmakers, 2011'), tending to make up their own minds (Highland-Print-Studio, 2011'). Whilst “the endless question what is a print?” (Fife&Dunfermline-Print-Studio, 2011') was identified as significant to members at Fife and Dunfermline. Dundee identified they were:

“Looking at issues of authenticity with regard to the use of digital technology, going back to that idea that you can either disguise the use of computers or you can celebrate it.” (DCA-Print-Studio, 2011')

Dundee were also paying close attention to the mainstreaming of 3D printing for example (DCA-Print-Studio, 2011'). Edinburgh stated:

“but I think, perhaps in the more ten years sort of timescale, when digital starts to become print; at that stage if that kind of debate (was about the) bigger change of methodology, of widening the sphere of what a print is for an artist, what's a new tradition. (Edinburgh-Printmakers, 2011')

In essence this supports the ethos of this research, examining the post-physical and post-studio practices possible through digital mediation.

4.1.2.1.4. Transition to New Forms of Printmaking

Examining possible transition to new forms of printmaking revealed that the current perspective amongst the interviewees still lies most heavily in traditional processes. Although Dundee identified that due to advances in photocopier technologies artists were using digital methods “even if they don't realise they're doing it” (DCA-Print-Studio, 2011'). Edinburgh said they were sensing more artists using digital outputs as the end point for their work, particularly in Glasgow, given its higher demographic of younger artists. Glasgow concurred that development is still slow because “there's

still an element of inaccessibility to the technology” (Glasgow-Print-Studio, 2011'). Edinburgh identified that the John Goto exhibition 'Mosaic' (see Figure 41) which was currently being hosted at the Edinburgh Printmakers Gallery was their first fully digital show, however this was countered with the view that:

“The thing that worries a lot of print studios is ... people see the kind of doomsday scenario that every print studio, that every college is going to close down their print department. No one's going to know how to make traditional prints and the end of the world will come about”. (Edinburgh-Printmakers, 2011')

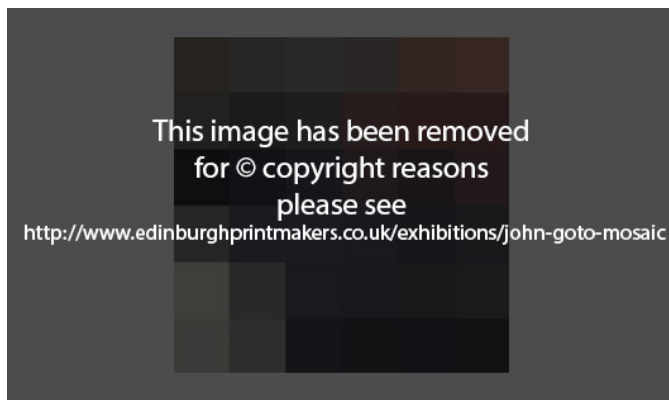


Figure 41: “Mosaic” John Goto at Edinburgh Printmakers 2011

Highland said about 20% of the work in the studio was digitally based, however accuracy was hard due to digital being used in other areas as a 'tool'. They saw it as "mainly to be something that's part of the studio but it's not in any way [dominant]" (Highland-Print-Studio, 2011'). Referring to cutting edge activity, Glasgow identified that although there is a lot of media information about new digital technologies in terms of 3D and virtual reality: “we are still [far] from what was cited 15 or 20 years ago, you'd think we'd all be sitting with headsets on now but it hasn't quite happened” (Glasgow-Print-Studio, 2011')

4.1.2.2. New Materiality and Signature (Research Objective 2)

4.1.2.2.1. Post Physical Forms

The workshops provided a diverse range of opinion on concepts of new materiality and signature. Edinburgh observed:

"The nature of making work on screen is as such a natural process. I think it just takes a slight [shift of] mind set for artists who have worked in print previously to start seeing something other than a piece of paper as an outcome". (Edinburgh-Printmakers, 2011')

Although Highland weren't against the concept of the work not resulting in a physical work, they "would always feel that it's never going to be a substitute for having a physical object" (Highland-Print-Studio, 2011'). Glasgow believed that although there were exciting opportunities, the development amongst print studios was slow and "artists and designers from the graphic world ... are using this technology far more". (Glasgow-Print-Studio, 2011')

When asked about 'print on demand' the concept of self-publishing for exhibition catalogues and publicity appealed to Fife & Dunfermline, Dundee thought they could foresee "that there will be a time ... when we'll have a print-on-demand machine for books or artwork" (DCA-Print-Studio, 2011'). They believed this would be manifest in the production of 'artists books' rather than e-Publications, as they believed that both the studio and its artists were still most "interested in ... producing actual objects, physical objects". (DCA-Print-Studio, 2011')

4.1.2.2.2. *Fluid Permanence – Reversible Process*

The workshops considered the possibility of digital process affording reversible process was already well embedded in working practices, with some artists "experimenting with colours [and] layering on their computer before we begin a process" (Peacock-Print-Studio, 2011'). Dundee identified it is now "taken for granted". Edinburgh suggested the adoption of reversible processes in working digitally:

"... goes two ways [for the artists] they either feel that they've resolved something enough that they want to then digitally output it, or they take that into [traditional] printmaking" (Edinburgh-Printmakers, 2011').

Only Glasgow and Edinburgh considered the concept of 'fluid permanence' where the artist is afforded a flexible matrix capable of infinite revision, with Glasgow identifying:

"...with digital work ... the process can go backwards or forwards, it's very fluid, you can make decisions and change your mind, you can produce the work on a different scale, if you've got a reasonable resolution file you can produce it as a huge piece of artwork or a tiny piece of artwork. And you can also easily produce a series of work based on the same core idea". (Glasgow-Print-Studio, 2011')

Interestingly Dundee identified a generational difference in acceptance of these concepts: "the younger generation, just do it without thinking". (DCA-Print-Studio, 2011')

The responses to signature of physical prints were clear as, with Glasgow: "We just go for a traditional way of presenting fine art prints, which is edition number, title, signature, and date." (Glasgow-Print-Studio, 2011'). Edinburgh reflected: "It's not really what artists are particularly interested in ...it's more what the galleries and the dealers have to worry about" (Edinburgh-Printmakers, 2011'), a view supported by Dundee who added "There's a lot of interesting work been done by artists about the notion of editioning, Felix Gonzalez Torres in particular." (DCA-Print-Studio, 2011').



Figure 42: Felix Gonzalez-Torres. "Untitled" (Death by Gun). 1990. Print on paper, endless copies. MOMA

4.1.2.2.3. *Beyond Signature*

Digital signature and 'authorising' post-physical works were not in the sphere of workshop operations and would need to be examined through the post-physical and post-studio practice of this research.

4.1.2.3. *Modes of Consumption (Research Objective 3)*

4.1.2.3.1. *Curating the Digital*

The participants revealed a collective focus on the use of digital mechanisms in curation of physical works and exhibitions. Edinburgh identified "We couldn't do it without it ... in terms of managing our images and sourcing those images [and] all our exhibition applications are by digital file" (Edinburgh-Printmakers, 2011'). Highland provided an interesting perspective. As they don't have a gallery space they tour their exhibitions and therefore "information is designed and produced digitally and emailed out ... it's quite a big factor" (Highland-Print-Studio, 2011'). Dundee reflected that publicity materials were digitally produced and distributed as a "matter of course" and that they saw a "movement towards more and more information, more images being available online" (DCA-Print-Studio, 2011'). Meanwhile Fife & Dunfermline identified the greatest significance of online curatorial practice was the opportunity to participate in International Juried Exhibitions (Hong Kong). Glasgow Print Studio secured funding to produce a physical archive of the studio's activities since its beginning in 1972 and were making this available in digital form. They reflected "it's not just the prints it's also photographic, documentary, about everything that's been produced, there's a lot of stuff on the site" (Glasgow-Print-Studio, 2011'); highlighting the potential for digital curation to extend beyond a record of the output work and reflect its authorship and means of production through digital meta-data.

4.1.2.3.2. *Networked Collaborations*

With reference to networked collaborations and notions of a digital atelier responses revealed a separation between the organisation and individual artists. Glasgow and Edinburgh cited their use of Facebook, Glasgow identified they were "not actively involved with any of the networks at the

moment [but] that's not to say we won't be" (Glasgow-Print-Studio, 2011'). Edinburgh identified:

"We see it as quite important to use Facebook and Twitter in a really proactive way, because we've noticed it can bring people in. [We] promote the student courses etc [and] for events in the gallery we had several events that we know the majority of people have come... because they've seen it on our Facebook, they've been invited to it from friends of theirs from Facebook, etc." (Edinburgh-Printmakers, 2011')

Responses about printmaker's networks such as Inkteraction, however, varied with Edinburgh citing "all the print staff have profiles on Inkteraction [but] I wouldn't say that they use it so actively now". Peacock's representative said: "I use both Inkteraction and Facebook regularly and keep in touch with my international printmaking contacts via these. I find the discussions very useful and encourage our users and students to join Inkteraction" (Peacock-Print-Studio, 2011'). Edinburgh reflected that, given the geographical proximity of UK printmakers, the significance of networks was not as great as for artists working in geographically distant regions in Australia and the USA for example. Highland identified networked collaboration in response to the population spread in their region, citing its use for "contact with other arts organisations within the Highlands (Highland-Print-Studio, 2011')

Glasgow, Edinburgh and Dundee have all experimented with their own online sales mechanisms. Referring to the use of individual online marketplaces, Dundee identified "individual staff ... are on sites like Folksy and Etsy, where they sell their work" (DCA-Print-Studio, 2011'), while individual members at Fife & Dunfermline also cited use of Etsy. Glasgow, cognisant of the possible opportunities of on-line selling, identified they had "been talking about setting up an online shopping cart within our own site for quite some time, the Culture-Label site started last year, prior to that we tried eBay [but] we didn't get great results from it" (Glasgow-Print-Studio, 2011') and Edinburgh said they had been "selling through 'Original

Prints' for the past five years or so" (Edinburgh-Printmakers, 2011') and were exploring the development of their own mechanism.

4.1.2.3.3. *The Online Marketplace*

At the time of these interviews discussion around the online marketplace was made at the beginning of Creative Scotland's promotion of 'Culture-label' for individuals and arts organisations. Dundee said they did not promote individual artist's works but online sales of DCA editions were for sale on the DCA website and "they're also now on Culture-label through Creative Scotland" (DCA-Print-Studio, 2011'). Dundee also thought "all the print studios are now represented on that website" and, although they had tried to set up a joint website with four other workshops, this was unsuccessful because there was "no-one who had the time to manage the website" (DCA-Print-Studio, 2011')⁴⁴

4.1.2.4. *The Philosophical Context of the Digitally Mediated Art Object (All Research Objectives)*

4.1.2.4.1. *'Aura'*

Considering 'Aura' in the philosophical context Glasgow identified:

"There's a greater acceptance, a much greater acceptance in buyers and ... artists towards digital prints, it feels as though it's kind of accepted now, although there is still going to be resistance here and there. (Glasgow-Print-Studio, 2011')

Edinburgh observed: "it's a new 'Aura', for sure it has a different feel" (Edinburgh-Printmakers, 2011'). Fife & Dunfermline identified: "the important thing is about knowing ... the knowledge about how things are made" (Fife&Dunfermline-Print-Studio, 2011'). Edinburgh also observed that this new 'Aura' might be associated with meta data:

"... like an online catalogue ... it gives the necessary background to allow people to go a little bit deeper ... you can actually hear the

⁴⁴Although the workshops and their individual artists have work on sale through 'Culture Label' they still maintain their own mechanisms, with the 'Own Art' scheme featuring significantly in their online outlets.

artist's voice ... or be inside their studio in a kind of intimate way that you wouldn't be allowed to otherwise ..." (Edinburgh-Printmakers, 2011')

Glasgow likened the acceptance of the digital medium to early resistance to silkscreen, which was initially viewed as a reproductive form and is now accepted as a valid fine art printmaking process⁴⁵. Dundee cited the work of Warhol and his ideas about "mass-production in society; consequently establishing its "own 'aura' ... which is very applicable to our times" (DCA-Print-Studio, 2011'). Peacock identified that "the level of the artist's involvement would contribute to the 'Aura'" (Peacock-Print-Studio, 2011').

4.1.2.4.2. Digital Medium and Simulacrum

Concepts of simulacrum and authenticity appeared to be similar amongst the interviewees. The primary concern was 'reproduction' and 'what is an original print?' Dundee identified that "first of all you have to exclude the kind of prints that are basically the same as painting, the monoprint, for instance and then it is dependent on the idea of reproduction as an art form in its own right. For example "the Nancy Spero giveaways or Barbara Kruger's work, all that generation of people working with print that is mass-produced, unlimited editions" (DCA-Print-Studio, 2011'). Peacock were clear that authenticity in a digital printmaking context is:

"An original image created by the artist purely as a digital print, that has not existed in any other form. As with other prints, this is an original, editioned fine art print that is a result of a true collaboration between artist and printmaker. It did not exist prior to this collaboration and could not be made in any other way. It is not a reproduction of any pre-existing artwork" (Peacock-Print-Studio, 2011')

The others interviewed on the whole, also held this position. Glasgow stated 'reproduction is reproduction' and that the digital products from that studio were 'original prints'. They also suggested artists 100 or 300 years ago would have adopted the technology without question "they would've

⁴⁵It was also observed that in Mexico, for example, it was still not accepted as such.

exploited it, they would've used it and we have the luxury to prevaricate about it, Picasso would've used it to the hilt" (Glasgow-Print-Studio, 2011'). Edinburgh identified that signature and editioning convention were still the "most straightforward way that we know that it's not... some facsimile of their work" (Edinburgh-Printmakers, 2011'), although this didn't resolve issues of; if the work was an 'original print'.

4.1.2.4.3. *Materiality and Permanence*

Generally workshops with digital facilities believe questions surrounding the permanence of digital prints to be largely resolved, citing that the inks are now high pigment and tested and the papers used are traditional fine art papers. Interestingly Peacock observed:

"Within other areas of printmaking we use handmade inks and papers which we trust are archival and these go through far fewer tests than digital inks. (Peacock-Print-Studio, 2011')

Highland offered a note of caution when comparing domestic ink jet printing to studio printing:

"You can see a difference between the large format Epson and a really high quality desktop and once you're used to that everything else seems rubbish; you become a snob." (Highland-Print-Studio, 2011')

The overview focused on the permanence of digitally mediated prints on paper and the concepts of post-physical forms and digital augmentation were not apparent. Thoughts around instantiation and temporal forms tended to focus on the potential to only print what was required each time, with the working process likened to etching: "most etchers that I know, print on demand, they'll print five up at a time" (Edinburgh-Printmakers, 2011') Although there was some evidence that thought was turning to new temporal possibilities, Glasgow said they had seen this develop recently with artists asking: "'could I have an edition that's in two sizes?' Can you? I don't know, is that Part one? is that Part two? So a lot of people are facing dilemmas about ... they want to do it." (Glasgow-Print-Studio, 2011').

Dundee believed it is “very rapidly becoming possible to download artist’s books ... and make them”.

4.1.2.4.5. Authenticity

When questioned upon concepts of Authenticity, the interviewees focussed upon the protection and promotion of the original print over the reproduction. Edinburgh Printmakers identified:

“I would expect them to sign them somewhere, on the back. Signature is definitely the most straightforward way that we know that it’s not someone else having brought in some facsimile of their work, of someone else’s work. Doesn’t necessarily answer the question of whether it’s an original print or reproduction you know that’s been used in a reproductive way, but if it’s been signed it’s certain that you know where it’s coming from.” (Edinburgh-Printmakers, 2011')

Whilst Highland also focussed upon the promotion of the original print:

“You know it’s not just protection it’s promotion of the original print as well because that’s what we like to be about so I think for instance if you set it around Giclee then you’re shooting yourself in the foot.” (Highland-Print-Studio, 2011')

Glasgow Print studio’s representative reiterated the significance of the artist’s involvement as the key to authenticity:

“The artist has to be involved in the matrix (and the signature)... ..we just go for a traditional way of presenting fine art prints, which is edition number, title, signature, date if you want it.(Glasgow-Print-Studio, 2011')

A position also reflected by Fife and Dunfermline:

“Well it’s the artist’s ideas, content, intentions, being very much you know the object, (the) product. But essentially the artist is controlling all of the process.”(Fife&Dunfermline-Print-Studio, 2011')

Meanwhile Dundee reflected that:

"... authenticity is something that needs to be questioned, constantly re-examined and re-evaluated. Again you go back to Benjamin and the advent of photography, when everybody was questioning authenticity; the advent of I don't know, engraving over hand-drawn, the printed book over the scribe's book almost. I don't think there's ever going to be a final conclusion about it and I think I would go back to what I said before about if the method of production is authentic to the artist's concept and it's well used then that is the criterion really. (DCA-Print-Studio, 2011')

Peacock Print Studio summed up the position of authenticity in digital printmaking as:

"(Authenticity in a digital context is...) An original image created by the artist purely as a digital print, that has not existed in any other form. As with other prints - This is an original, editioned fine art print that is a result of a true collaboration between artist and printmaker. It did not exist prior to this collaboration and could not be made in any other way. It is not a reproduction of any pre existing artwork.(Peacock-Print-Studio, 2011')

4.2 Research Probes

4.2.1 Research Probe 1 "born digital – new materialities" digital print exchange

The "live" element of the research was undertaken in two phases: Phase one during the period January to April 2011, during which the network of contributing artists were recruited using social networking. Wholly digital mechanisms were used to co-ordinate, track and develop meaningful links with the artists in the development, instantiation and contribution of their "born digital" works. Phase two: the curation, publication and distribution of the exchange portfolio, mediated through digital distribution/consumption mechanisms (e-publication and e-surfaces), was completed during the period April–June 2011. The whole digital portfolio is available at: <https://openair.rgu.ac.uk/handle/10059/776> and the accompanying Data CD.

Overall 49 artists from 10 international locations contributed to the exchange and inherent submission survey (see Figure 43 below).

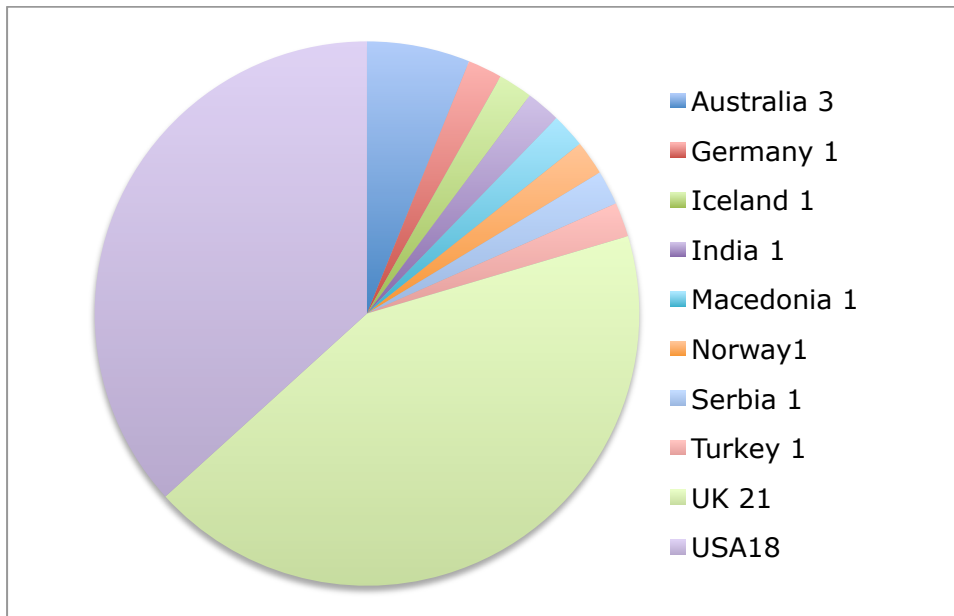


Figure 43: Distribution of Submitting Artists (Thompson 2011)

On completion of the artist's works and submission of survey materials, participants were invited to complete the follow up survey designed to further ascertain their perceptions and positions in relation to their practice. This survey attracted a 32% response rate in comparison to the initial submission survey (see Figure 44 below):

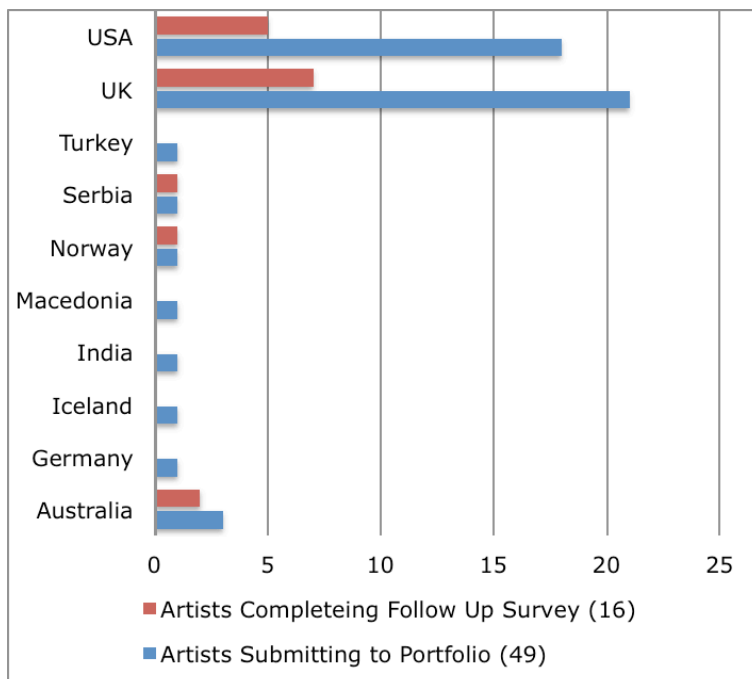


Figure 44 Completion rates for follow up survey (Thompson 2011)

Following data collection, data analysis and correlation was used to establish commonality and divergence models. These were contextualised against findings from the critical review through evaluative process. As the data generated from the various elements of the research are diverse, mixed methods of data analysis were adopted. They were based on theories of compositional interpretation (visual images) and discourse analysis (supporting materials), as defined by (Rose, 2007'). Analysis of the gathered data is discussed below.

The works submitted are as diverse as the artists themselves and through the digital print medium they make expressions relating to: aesthetics and process (Figure 45: "Frenzy", Janssen T. (2011), USA), natural/environmental exploration (Figure 46: "Projected View", Clark A, (2011), UK), socio-political conditions (Figure 47: "Democracy Corrupted", McMaster R. (2011), Australia) and philosophy and the human condition (Figure 48: "Permutation", Cornell D. (2011), USA).

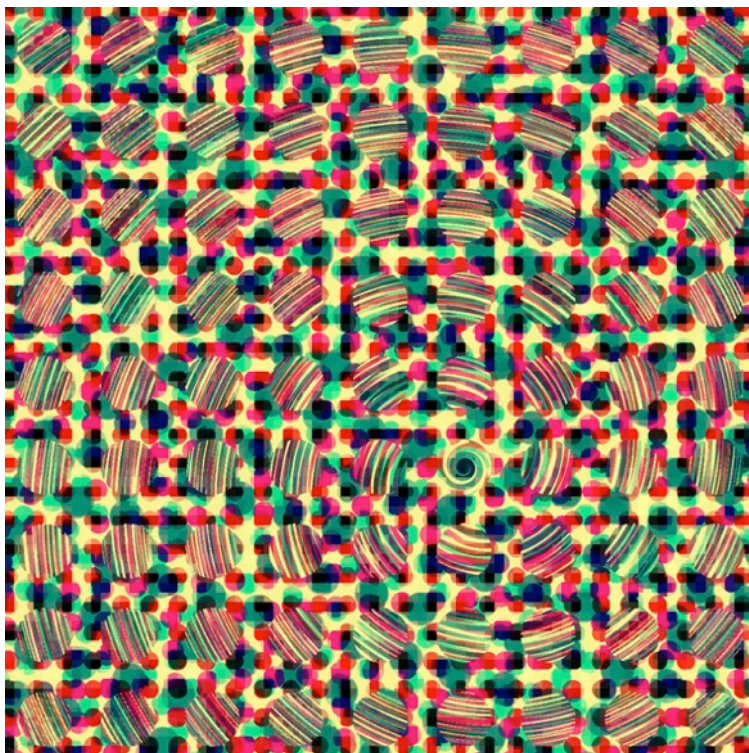


Figure 45: "Frenzy", Janssen T. (2011), USA

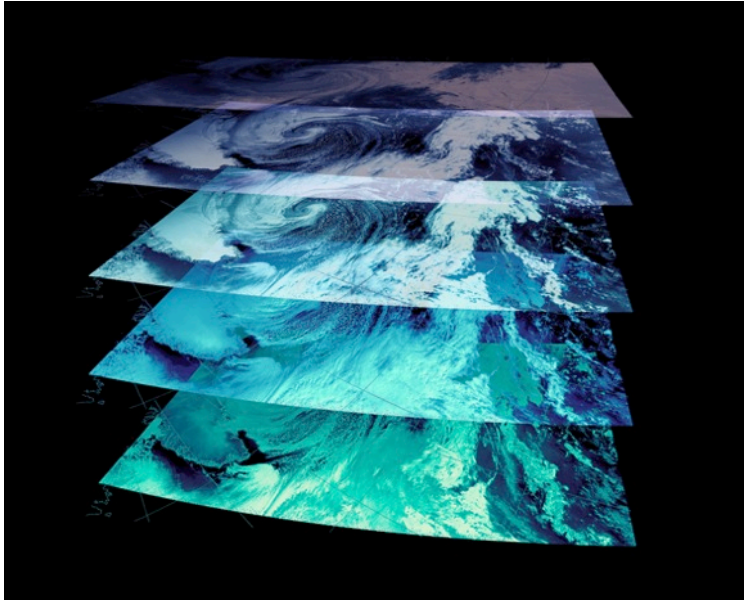


Figure 46: "Projected View", Clark A, (2011), UK

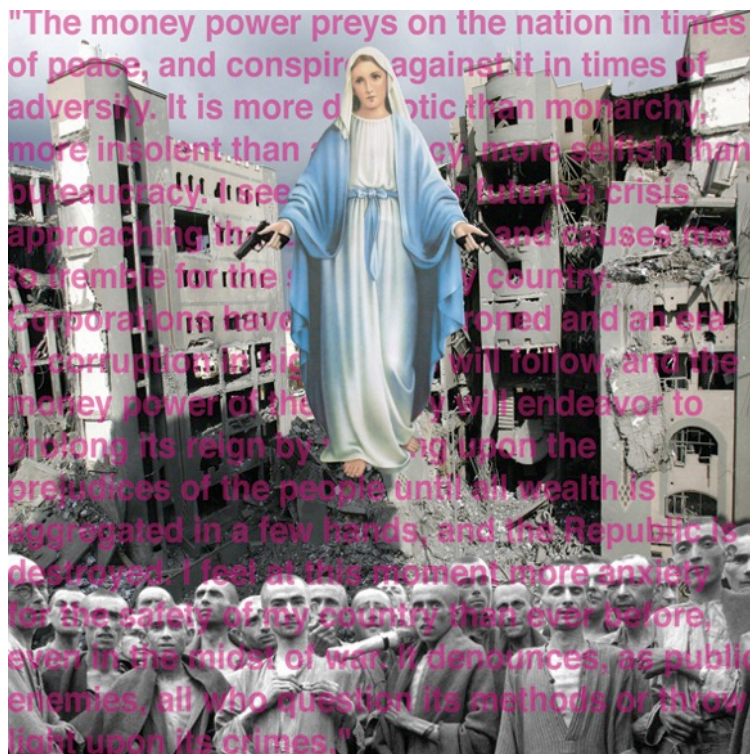


Figure 47: "Democracy Corrupted", McMaster R. (2011), Australia



Figure 48: "Permutation", Cornell D. (2011), USA

The researcher was able to identify relationships to traditional formats, for example: printmaking, painterly, illustrative and lens based, illustrated by the following examples from the collection: Printmaking Figure 49: "OrnamenNov1", Nicol C. (2011), USA, painterly Figure 50: "Little Lover", Low K. (2011), UK, illustrative Figure 51: "I have a Headache", Wicka L. (2011), USA and lens based Figure 52: "Bridge of glass, sea of fire", Bang A.E. (2011), Norway.



Figure 49: "OrnamenNov1", Nicol C. (2011), USA

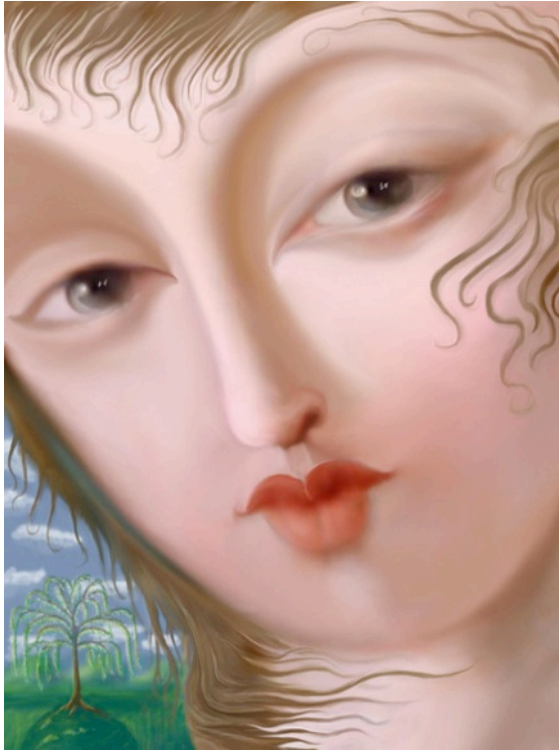


Figure 50: "Little Lover", Low K. (2011), UK



Figure 51: "I have a Headache", Wicka L. (2011), USA



Figure 52: "Bridge of glass, sea of fire", Bang A.E. (2011), Norway

Comparison of the methods of instantiation (editioning) selected by respondents (see Figure 53 below) provided an interesting range of responses. 49% of respondents identified archival digital print to paper, 27% that their work could be printed to either digital or physical surfaces. 10% said their work was made for digital instantiation only, 8% indicated non-standard surfaces (steel 3D objects) while the remainder indicated no preference.

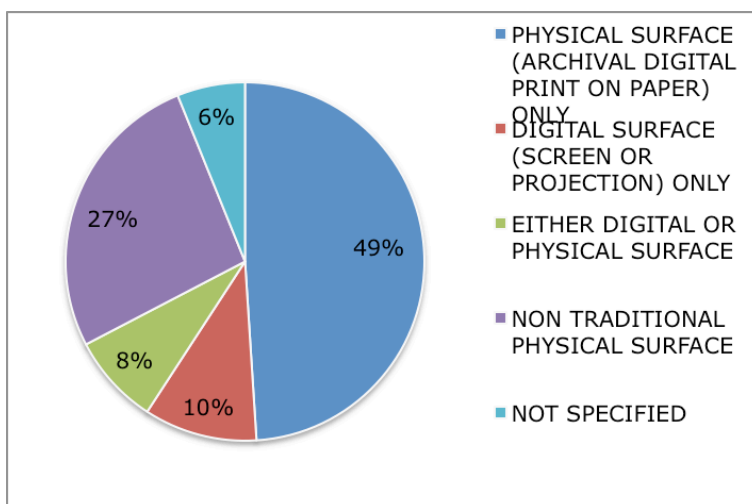


Figure 53: Comparison between selected methods of instantiation (editioning).

The artist's submission survey responses provided an indication as to the balance between Bitmap and Vector based processes in the development of the works as illustrated by Figure 54: Comparison of usage between Bitmap and Vector based processes (below).

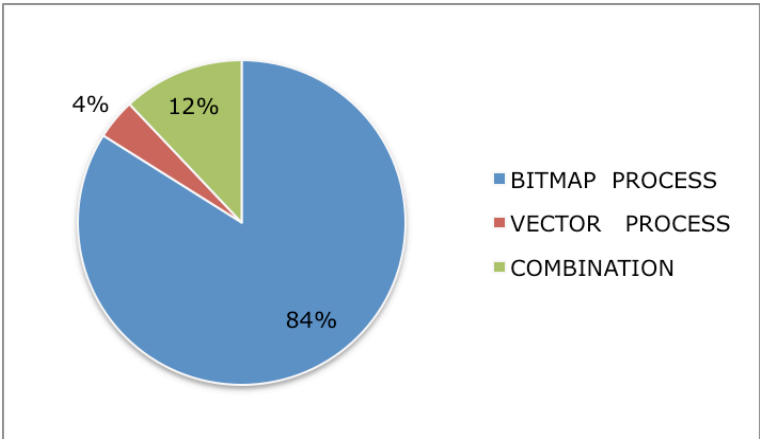


Figure 54: Comparison of usage between Bitmap and Vector based processes

A predominance of Bitmap based processes was revealed amongst these artists and further analysis showed that the artists used proprietary software packages, rather than generative or code based activity.

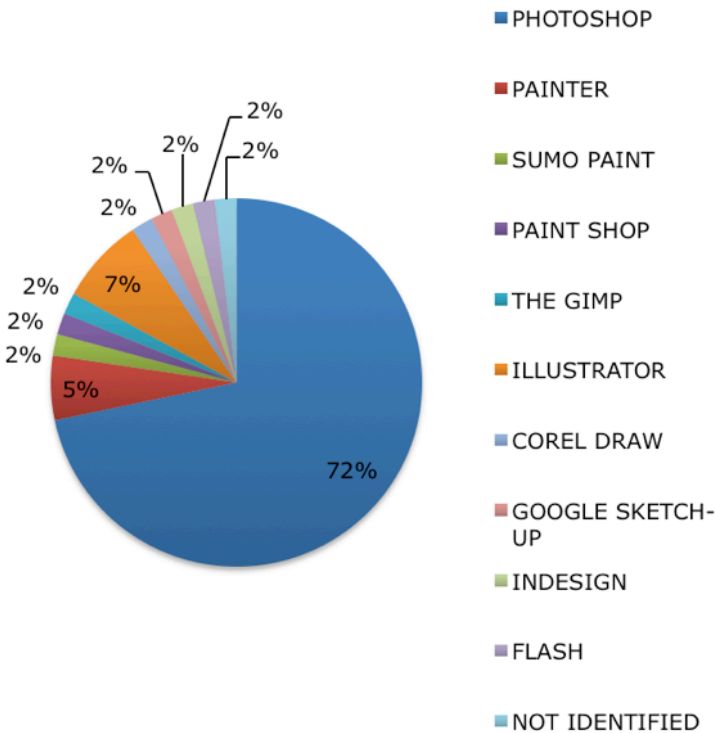


Figure 55: Software used in digital mediation

Overall, 'Photoshop' was the predominant package amongst the bitmap applications and illustrator amongst the Vector based.

The artists' submissions to, 'born digital – new materialities' represent a significant snapshot of digitally mediated print making practice. These works provide artistic responses to the potential for new aesthetic pleasures and the aesthetic value that stems from experiencing, owning and collecting original digital prints.

The picture is of a diverse range of international artists using both bitmap and vector based methodologies, which feature image layering, manipulation and the use of flexible processes inherent within the technology. Overall there is a sense of mixed digital approaches reflecting the diverse contexts of the individual artists, with each striving to evolve their own visual language (see Figure 56: "Greenman - Spring", Gallagher K. and Stark G, (2011), UK below).



Figure 56: "Greenman - Spring", Gallagher K. and Stark G, (2011), UK

4.2.2 Research Probe 2 'Code as process' explorations of temporality

Probe 2 was founded on the concept that engagement with the art object, when “presented through an online or digital medium, shifts from the physical to the temporal” (Corcoran, M. 1996); providing the potential for the spectator to engage and re-engage with the art object on demand. The results of Probe 2 explore the manifestation of alternative temporal form drawing upon notions of Deleuzian objectile constructs, where each engagement constitutes a unique impression. This is a digital evolution of the paradox of print where the original print only exists when the first copy is made⁴⁶. It became apparent after contextual review and evaluation of early experiments⁴⁷ that coding would need to form a basis for the work of the Probe. Two coding avenues were revealed: ‘processing’ and ‘flash’, with parallel development and evolution undertaken as identified in section 3.4.2.

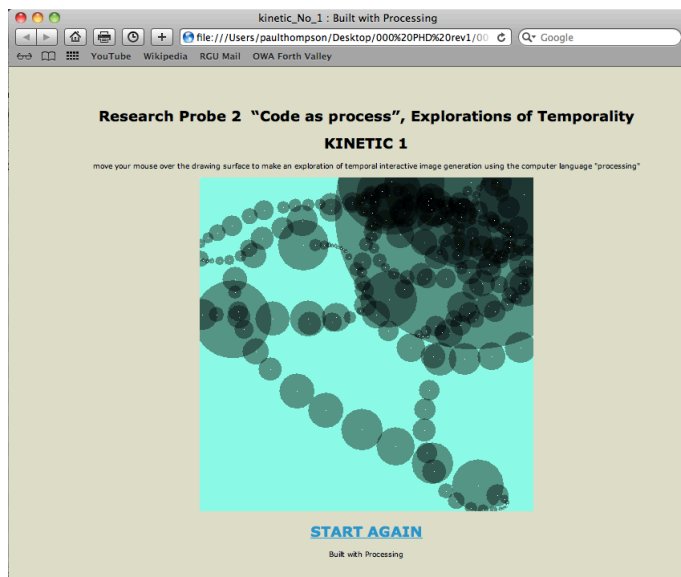


Figure 57: Kinetic 1

⁴⁶Code of ethics for original printmaking MALENFANT, N. & STE-MARIE, R. 2000. *Code of ethics for original printmaking*, Montreal, Conseil Quebecois de l'estampe.

⁴⁷4.2.2 - Research Probe 2 Code as process

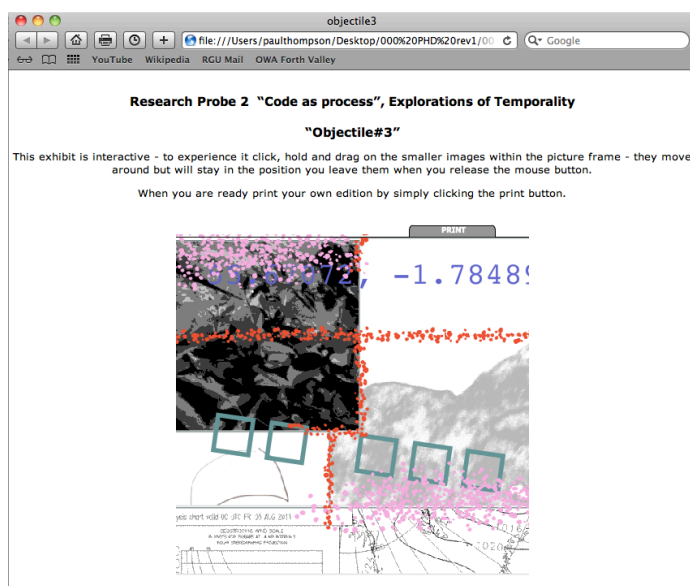


Figure 58 Objectile 3

Figure 57: Kinetic 1 and Figure 58 Objectile 3 represent the works produced as part of this Probe (samples drawn from the entire body of work for this Probe are presented in Printmaking2.0 a Portfolio of Practice⁴⁸). Kinetic 1 is representative of works produced using 'processing' and Objectile 3 represents works using Adobe Flash.

Kinetic 1 is code rather than image based and has no indexical relationship to any pre-existing form, although it may be coded to allow printing (or not) it has never existed in physical space. Its order and structure would not normally be recognised by a traditional printmaker. Although the artist controls the presentation, the 'print' is playable and interpretation is not fixed, with each instantiation, it is 'multiply unique' and a variation on a theme (see Figure 59). Conversely Objectile 3 is image based and thus has an indexical relationship to physical space. The spirit of a physical imprint to surface remains in this work and the form maintains a layering structure, which would be recognised by a traditional printmaker. The artist controls the order and presentation of layers and the participant only controls a restricted set of variables (see Figure 60).

⁴⁸www.printmaking2-0.info/portfolio and/or accompanying CD

The results of this probe show a new area for printmaking practice. The art object is created of original intent, mediated through technology which is manifest on demand and explores concepts of the 'created object' (Sterling, 2005'). Significantly the artist audience relationship is expanded from passive to participatory, from looking to doing, from spectator to actor and as such the matrix is no longer fixed, nor remains wholly in the control of the printmaker (see Figure 59 and Figure 60 below). These second generation works (Printmaking2.0) were developed in response to ideas of objects multiply produced from new types of matrix and 'printed', but no longer wholly bound by being printed in two dimensions or even physical space.



Above: Probe 2 Kinetic 1 installed in the Public Exposition at Robert Gordon University.

Right: Image sequence recording a participants collaborative engagement with the work

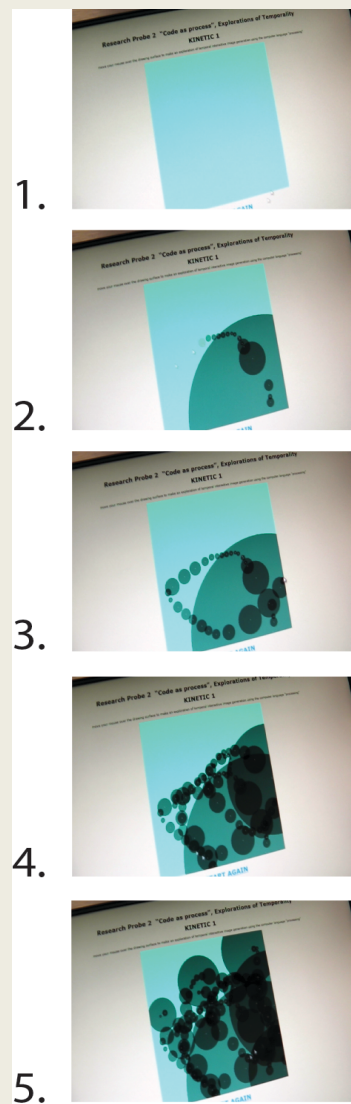


Figure 59: User engagement with Probe 2 Kinetic 1



Above: Demonstration of Probe 2 Objectile 3 in the Public Exposition at Robert Gordon University.

Right: display of participants collaborative editioning of the work



Figure 60: User engagement outputs from Probe 2 Objectile 3

4.2.3 Research Probe 3 The Print as portal: augmented reality optical/image recognition experiments.

Probe 3 was designed to explore the post-physical print and its constitution as image + storage + organisation + retrieval + navigation (see Figure 61 below).

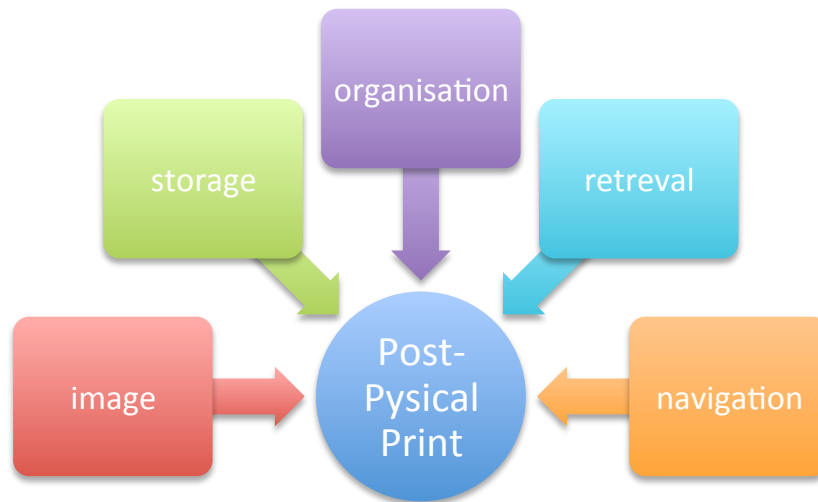


Figure 61: The constituent elements of the post-physical print

It was specifically directed toward using an augmented reality digital matrix to explore the potentials of Printmaking2.0. As this probe developed it focused on exploring these aspects through image based recognition. The works for this probe were created and are resident in digital space, from source materials captured by digital processes.

There were two concluding outputs from Probe 3: 3.1 'Labyrinths' exploring concepts of the digital print matrix and 3.2 'Four Walks @ 55 Degrees North' exploring temporal and objectile post-physical print making⁴⁹. Each output employs physical instantiations that act as portals to digital space. Demonstrations of these outputs are available in Video Resource DVDs 1&2 (DVD1 : "Demonstration of Research Probe 3" and DVD2 : at 00:44:34 to 00:56:30) Online versions/archives are also available in Printmaking2.0 Portfolio of Practice⁵⁰ (and/or within CD 1 "Website & Digital Portfolio of

⁴⁹ See Figure 62: Process Chart Probe 3.1 and Figure 63: Process Chart Probe 3.2

⁵⁰www.printmaking2-0.info/portfolio and/or accompanying CD

Public Outputs"). Whilst Figure 73 to Figure 78 also illustrate these and further public demonstrations at Robert Gordon University and the IMPACT 8 Conference 2013.

Section 2.2.1 identifies this research is framed in the context of technological evolution and the "adoption of pervasive digital technologies" (McCullough, 2004'). Smart phones (iPhone and Android) provide the user their own personal access to public and personal digital space. Recent developments in the development of augmented reality applications such as 'Layar' and 'Junaio', realise an example of William J. Mitchell's predicated mechanism for "the continual injection of useful information into contexts where it was once inaccessible and where it adds a new layer of meaning." (Mitchell, 2005'). Probe 3 was designed to examine the potential for imprinting new virtual layers of meaning beyond the physical print, through the mode of augmentation.

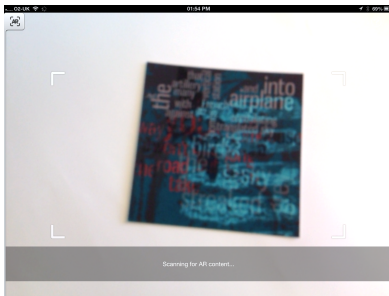
1. Composed of a portfolio of 12 digitally mediated prints



2. Each print is a portal to digital space



3. Which when scanned in the Junaio App



4. Opens the Digital Matrix for each print



Process Chart

Probe 3.1 "Labyrinths"

Figure 62: Process Chart Probe 3.1

Probe, 3.1 "Labyrinths" is composed of 12 digitally originated and mediated prints, which were editioned as physical archival ink jet prints from a digital matrix. Each print is subject to image recognition when scanned with the Junaio app and, through augmentation; the digital matrix opens for that print⁵¹ (see Figure 62). The matrix is composite of the editionable image and the meta-data of its production including the textual and image based sources gathered for its production. It is presented under creative commons as an open edition.

⁵¹Each matrix is held and presented through <http://gofp-meta.blogspot.co.uk/>

1. The Junaio App is launched



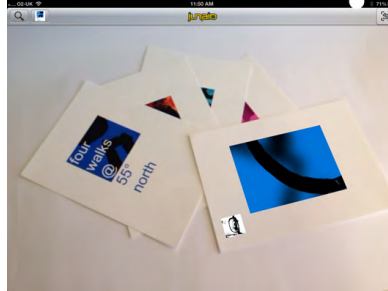
2. Scan button selected and image recognition takes place



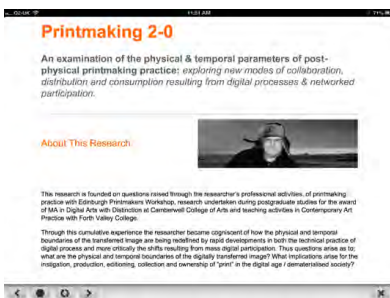
3. Image triggers augmentation - Introductory video shown here



4. Each print triggers it's own augmentation in this case the original temporal objectile print and also a signature image which is a button



5. Signature image button leads to artist meta data



Process Chart

Probe 3.2 Four Walks @ 55 Degrees North

Figure 63: Process Chart Probe 3.2

Probe, 3.2 'Four Walks @ 55 Degrees North' (Figure 63) is composed of four digitally editioned physical prints and a cover sheet. The cover sheet acts as a portal to an introductory video in which the artist explains the context of the works. The prints act as portals to their original digital form from which they are imprinted. Conceptually they are self-referencing, drawing on content (meta data) in the public domain and offering the expanded contexts accessible in Printmaking2.0. Each print-based augmentation also provides a digital signature button, which leads to the artist's meta-data (see Figure 69).

The reader may experience extracts of both Probe 3.1 and Probe 3.2 by scanning the QR Code⁵² below (Figure 64) installing the Junaio app and scanning Figure 65, Figure 66 and Figure 67 below.



Figure 64: QR Code link to Junaio App download

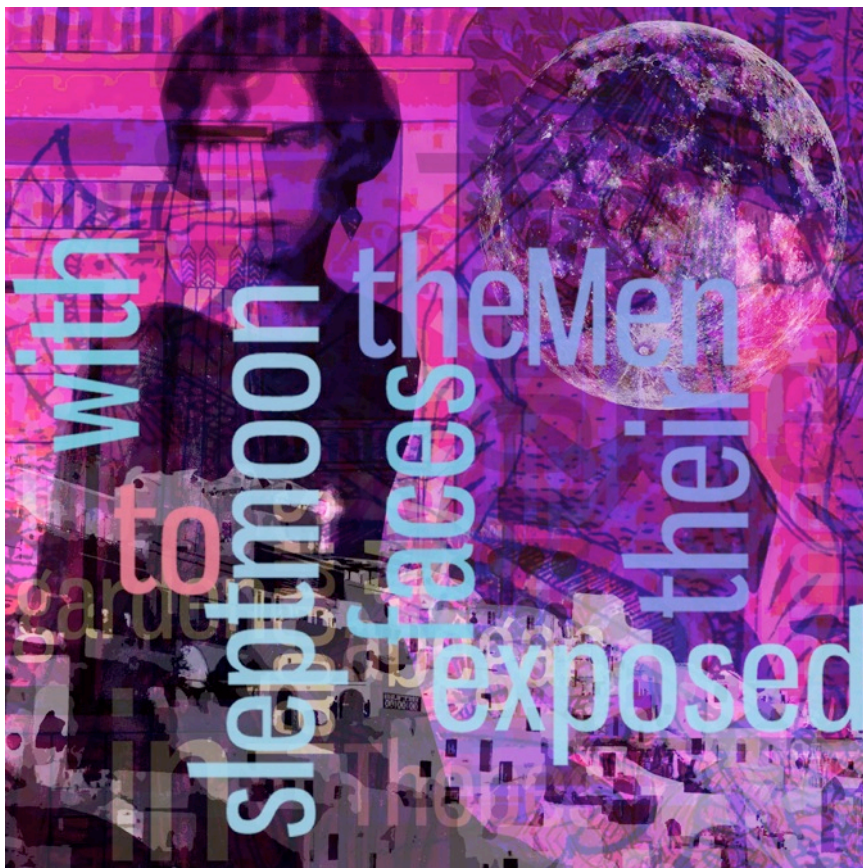


Figure 65: The Immortal

⁵²Quick Response Code

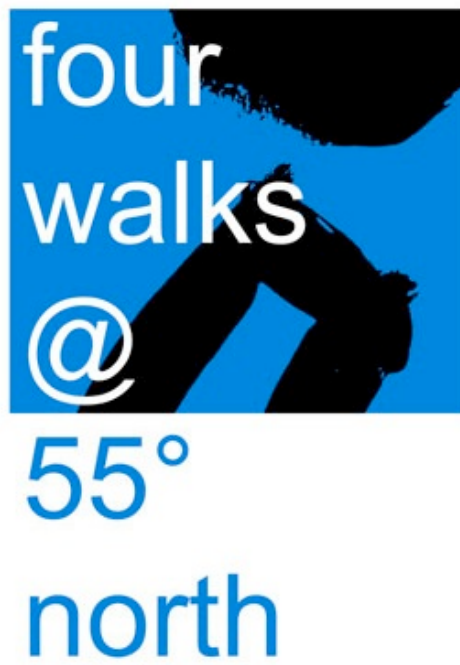


Figure 66: Four Walks cover

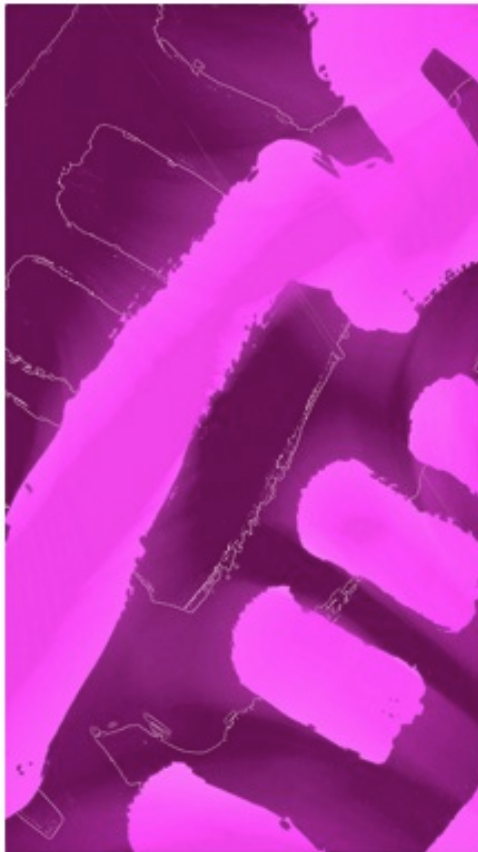


Figure 67: Walk 3 (sample from portfolio)



Figure 68: The Immortal Digital Matrix



Figure 69: Artist's Biography / Meta Data

Both 3.1 'Labyrinths' and Probe, 3.2 'Four Walks @ 55 Degrees North' were deployed to the Junaio platform using the augmented reality authoring application Metaio Creator, as illustrated in Figure 70 below.

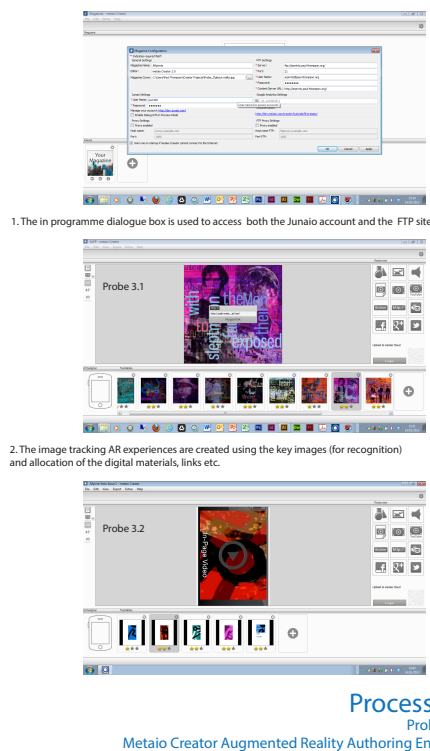


Figure 70: Process Chart Authoring Probes 3.1 and 3.2

Both outputs from Probe 3 draw on the researcher's printmaking practice, forming digital constructs elicited through digital sourcing (virtual explorations). Practice Probe 3 examines the dialectic identified as part of contextual review between digital and analogue (traditional) printmaking. Focusing on the boundaries suggested by both Gollifer and Barfield (see Section 2.5.3 Academic Discourse), this probe provides applied examples which interrogate the boundary between physical and post-physical digital print. Through the model developed in Probe 3 the researcher's practice explores the adoption of digital tools, to make works which espouse the potential of the medium using multiple coding as a common language of printmaking, linking physical and virtual surfaces through a digital matrix.

Core to the practice model established in Probe 3 are explorations of new materiality and signature. Through the use of image-based recognition the work explores the potential for a post-physical or virtual layer beyond the physical layers normally associated in the analogue print. In this context the physical print surfaces were originated from the virtual as portals back to the virtual embodiment of the artwork. This raises questions as to the

uninitiated observer viewing them as traditional images and hence raises new questions of connoisseurship. The two products of Probe 3 reflect differing applications of this post-physical layer. Probe 3.1 Labyrinths is concerned with concepts associated with the digital matrix, digital permanence and allocation (see Figure 62: Process Chart Probe 3.1). Probe 3.2 Four Walks @ 55 Degrees North explored materiality and signature through 'digital affordance', in which "Rather than thinking about using a computer, you think about using a room, a world, or a whole environment of computers" (Moggridge, 2007'). Digital affordances can as Naughton identifies be both "actual and perceived"(Naughton, 2012a') and within the context of this research present us with the opportunity for shaping the 'affordance of experiences' resident in the hybrid states between physical and digital space.

This Probe focussed on exploring temporality through the development of an 'objectile' digital print matrix and its subsequent deployment through augmented reality, authenticated by post-physical signature. Overall the post-physical layer should in itself be viewed as one possible new paradigm (which goes beyond signature) for identification and authorisation of the digitally mediated print art object (see Section 2.3.3 Beyond Signature). Production and consumption of mass cultural products continue to undergo significant changes through the application of mass digital participation via pervasive digital systems, consequently this Probe was designed to examine this. The Probe reveals that through the integration of personal and public digital space the artist is able to not only digitally 'make' the work⁵³ but facilitate its curation, distribution, archival⁵⁴ and inferred subsequent access.

In this model the product of the artist's working matrix, sourced through and resident in the artist's personal digital space, is distributed by 'authorised' public digital space afforded through 'Google Blogger' which provides an 'open source' model of agreement access, allocation and

⁵³See Printmaking 2.0 - Portfolio of Research Practice & Public Outputs Artistic Practice - Research Probe 3 The Print as Portal and/or accompanying CD

⁵⁴See Figure 68, p.164

authorisation. This structure could equally be adapted using an e-commerce mechanism to form a paid purchase, lease or subscription model.

A further example of the expanded potential for digital curation of the digitally mediated print resident in digital space was the collaborative digital editioning of Probe 3.2 (see Figure 71 below) over distance. The artist collaborated with printer and curators, to edition and install the works, while geographically remote from both, the artist was in Edinburgh and the printer and curators were in Aberdeen.



Figure 71: Probe 3.2 (Digitally editioned, collaboratively over distance)

Research Probe 3 encompasses both physical and post-physical prints afforded through a digital matrix and its results highlight the juxtaposition between physical and digital space and the potential for new forms of perception and 'Aura'. Probe 3.1 'Labyrinths' reflects the formation and application of the conceptual model of a "Spime" (Sterling, 2005). In which the potential for the second generation 'print' to be created, curated and conserved via established international multimodal-networked systems (Junaio and Google Blogger in this scenario) from which the percipient may 'pull' the print on demand. Probe 3.2 'Four Walks @ 55 Degrees North' demonstrates the application of augmented reality through the physical

print form, providing a portal from physical to digital space and consequently new concepts of 'Aura' in a post-physical context.

The practice outputs from Research Probe 3 reflect an extension of the digital medium, beyond a 'closed affordance' in the artist's practice towards a digitally mediated 'conversation' with the audience through the medium of pervasive computing. This is facilitated through the digital archival of source, process and product that retain notions of the real juxtaposed against those of the virtual. The temporal model shifts from the absolute to relativistic. These digitally mediated art objects are originated, curated and conserved via a multimodal-networked system and conform to Sterling's concept of a "Spime" rather than Baudrillard's "third order simulacra of postmodernity" (Macey, 2001') which "have no relation to reality whatsoever and are their own pure simulacra or imitations of imitations" (Ibid).

The research explored the practical application of theory surrounding objects no longer being imposed on a 'law of constancy' (Deleuze, 2006') but having a "new status" (Ibid) in which "... the object no longer refers its condition to a spatial mould – in other words, to a relation of form-matter – but to a temporal modulation ..." (Ibid)⁵⁵. This shifts the aesthetic experience from the imprinting of permanent layers in physical space to an augmented temporal experience. Probe 3.2 provides a new concept for the potential of print instantiation from an objectile matrix, a wholly new construct in these terms. As illustrated in Figure 72 (p.177), using video editing software and moving image technologies afford further potential in producing a temporal matrix capable of being scrolled forward and back and subsequently being instantiated at any point in this continuum.

The work of Probe 3 was founded on notions of printmaking, analogue or digital, being a 'medium of the multiple'. Rosalind Krauss comments: "as we have been constantly reminding ourselves since Walter Benjamin's work

⁵⁵See also Section 2.6.4 Instantiation and temporal form

'The Work of Art in The Age of Mechanical Reproduction,' authenticity empties out as a notion as one approaches those mediums which are inherently multiple" (Krauss, 1997'). These explorations seek to provide a practice model for the employment of meta-data and virtual layering as authentication of the work in which embedded provenance is digitally layered into each instance of the 'print'

1. Analogue drawing process are used to develop "memory maps" of the walk routes.



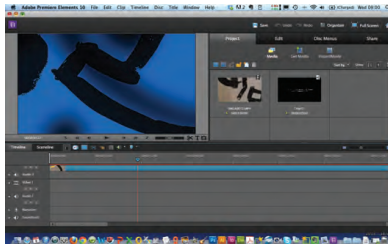
2. Subsequently enlarged to be digitised by drawing with a hand held HD video camera



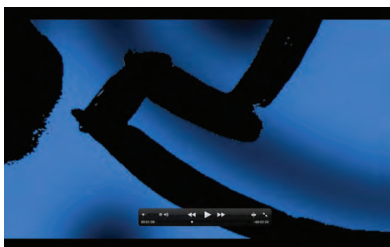
3. The raw digital drawing is video shown here



4. Then processed using video edit software (premiere elements 10) rather than a bit map editor (e.g. photoshop) an objectile print matrix is produced in digital space



5. From which a physical instantiation (print) is selected to become the AR portal back to an editioned version of the temporal objectile print



Process Chart
Probe 3.2 Four Walks @ 55 Degrees North
Digital Drawing Temporal Origination

Figure 72: Digital drawing/temporal origination



Figure 73: Public demonstration of Probe 3 at 'Probes' Exposition Robert Gordon University 2012

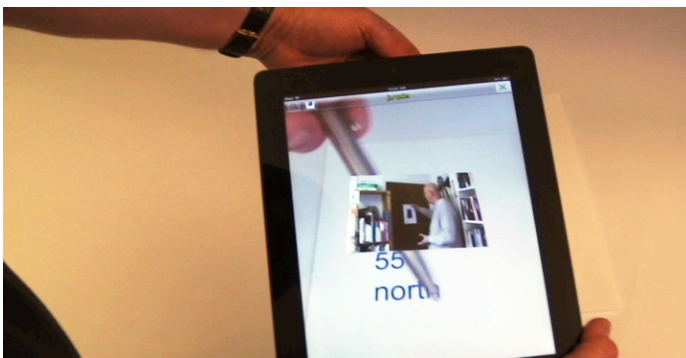


Figure 74: Extract from demonstration video of Probe 3 (see Video Resource DVD no1 at 00:06:25)

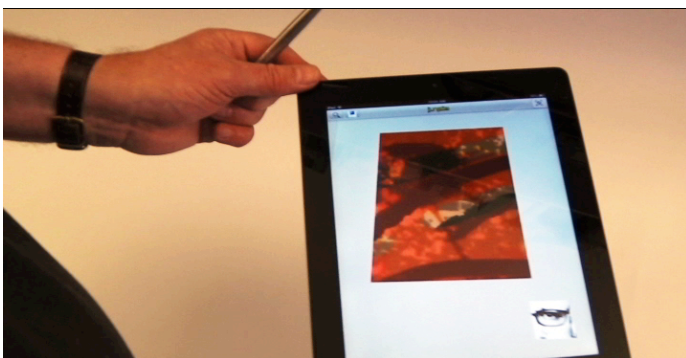


Figure 75: Extract from demonstration video of Probe 3 (see Video Resource DVD no1 at 00:07:05)



Figure 76: User engagement with Probe 3 (see Video Resource DVD no2 at 00:48:01)



Figure 77: User engagement with Probe 3 (see Video Resource DVD no2 at 00:51:16)



Figure 78: Public Demonstration of Probe 3 at IMPACT8 Conference Dundee 2013

4.2.4 Research Probe 4 'Picture Space': Walking in a Garden of Forking Paths': augmented reality geo-located multiples exploring conceptions of indexicality in digital and virtual space.

As with Probe 3 this Research Probe was designed to explore possible practice model(s) for post-physical printmaking within a digital matrix founded in 'digital space' (Kilian, 2000' 118) exploring notions of post-physical, multiple and simultaneous digital print forms. Probe 4 is the artist/researcher's response to the landscape of digital space generated through the layering of stimuli formed from image and data shadows. It is founded on the boundaries of temporal constructs within a non-linear, relative time model.

The post-physical print artwork is presented as an outdoor installation in 'physical space' and is inspired by ideas of "ambient findability" (Morville, 2011') and the writings of Jorge Luis Borges in which there are an "infinite series of times, a growing, dizzying web of divergent, convergent and parallel times ... all possibilities" (Ibid). There are 12 digital markers located in 'virtual space' that are accessed using 'LAYAR' app on either an iPhone, iPad or Android phone (see Figure 80: Probe 4 (Deployment) below). Probe 4 also uses the 12 elements conceptually based on Borges's Labyrinths, however, this probe concentrates on the potential for geo-located triggers as the portal to the digital construct, dislodging notions of physical form and shifting into relative temporality. A state in which the print is unfixed and the spectator can move between the 'states' of the print. Consequently Probe 4 seeks to develop concepts of the digital matrix forming the space of collected information 'for', 'by' and 'about' the post-physical printmaker. A conceptual 'Wunderkammer' where individual portals of "nearly every space we live in, be it work, home, travel or pleasure, is characterized by a digital layer." (Ciolfi, 2011' 205-222) A digital layer frames the multiple and interlinked, digitally mediated 'prints', formed of data imprinted on physical space through Printmaking2.0.

- [illegible]

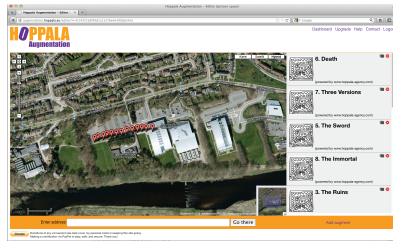
- The screenshot shows the Hoppala Augmentation website with a list of 10 augmented reality experiences. The experiences are arranged in a grid. Each experience has a thumbnail image, a title, a description, and a link to the experience. The experiences are: 1. The Lottery, 2. The Lottery, 3. The Theologians, 4. The Rules, 5. The Immortal, 6. The Second, 7. The Lottery, 8. The Lottery, 9. The Lottery, 10. The Lottery. The website has a navigation bar with links to Home, About, and Contact. The Hoppala Augmentation logo is in the top left corner.

-

Figure 79: Probe 4 Origination

Probe 4: 'Picture Space: Walking in a Garden of Forking Paths' is a construct of materials gathered in and is itself located in digital space. As illustrated (Figure 79) the overarching layer or matrix is constructed using the 'Layar Developer' interface. Once created the Hoppala content management system was used to create a 'point of interest' (geo-located marker) for each layer of the 'print' and then deployed.

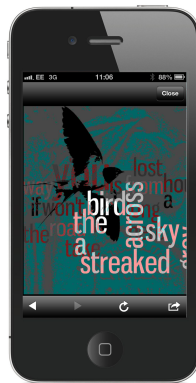
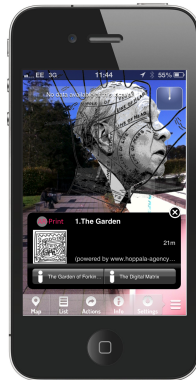
1. Geo Located markers are allocated to the exposition site (they can also be duplicated - creating multiple editions and allocated to new other sites)



2. Layer launched and Geo Layer selected



3. Scanning in Geo Location reveals Augments in app window Imprinting the Post-Physical Print on Physical Space



4. App window allows for selection of the extended print - form



5. App window also provides access to Digital Matrix

Process Chart

Probe 4 "Picture Space: Walking in a Garden of Forking Paths" Deployment

Figure 80: Probe 4 (Deployment)

After the Probe was deployed the final allocation of the markers was made to the exposition site as illustrated above. It is possible to create multiple copies of each layer which may be viewed as being similar to traditional editioning (in this case RGU and Forth Valley College editions were created). The spectator then scans the geo-location and can interact with each element, which affords access to the extended print form and the 'digital matrix'.

As with Probe 3, Probe 4 is framed in the “adoption of pervasive digital technologies” (McCullough, 2004'), through smart phones and their associated technologies. In Probe 3 the focus was on image tracking and recognition as a portal to the digital imprint, the work of this probe developed from the adoption of geo-located augmented reality tools. Additional contextual study revealed viable models for examining the imprinting of virtual constructs onto physical space as a post-physical fine art printmaking practice; contextualised against concurrent explorations in site specific/public art and photography as illustrated in the work of John Craig Freeman⁵⁶ and John Goto⁵⁷. Similar to the work of Freeman (site specific/public art) and Goto (photography) where traditional concepts of physicality are challenged, Probe 4 dislocates physicality in the imprint. As virtual imprints the 12 triggers of Probe 4 reflect an ‘intellectual shift away from simple object production’ as described by Hovagimyan “through a mode of presentation appropriate to networked culture” (Hovagimyan, 2001), in which digital affordances allow art to be made and perceived in new ways. This permits a synergy between artist and audience immersed in the virtual layers of the ‘print’.

In this sense Probe 4 illustrates the affordance of new physicality via electronic surface instantiation including e-publication, e-paper and digital surfaces⁵⁸. In this context the quotient of the digital art object’s temporal permanence is set against its potential for variable but repeatable instancing/re-instancing over the longevity of its server space. In the audience experience and potential ownership of these prints permanence has become fluid, reversible and repeatable; with each instantiation being a unique copy ‘pulled’ into sentience by the percipient. In this probe the printing process has become networked and virtual, so the notion of gallery space also shifts. John Freeman identifies “with the proliferation of

⁵⁶Site specific public art FREEMAN, J. C. 2012. *John Craig Freeman - Blog* [Online]. USA. Available: <http://johncraigfreeman.wordpress.com/> [Accessed 3rd January 2013].

⁶⁰Photographic practice GOTO, J. 2012. *John Goto* [Online]. UK. Available: <http://johngoto.org.uk/> [Accessed 9th December 2012].

⁵⁸See section 2.3 of the contextual review

smartphones and free public apps such as Junaio and Layar, channels of virtual space paralleling real locations have become a new architectural space in which to create, exhibit, and distribute art.” (Freeman, 2012')

Although the constructs produced in Probe 4 'Picture Space: Walking in a Garden of Forking Paths' were created through digital layering of materials gathered from the digital landscape, this process is no different to the common use of appropriated images in 20th and 21st century analogue printmaking. Through concepts of a digital matrix access may be afforded to the source image and its meta-data, which would not easily be facilitated in an analogue print and authenticity and authentication may be seen to be a product of validation. This validation is in the form of traceable digital signature, through the service providers, URLs and the artist/author's legal commitments when they join these services.

4.2.4.1 DART Seminar



Figure 81: Augmented reality workshop during DART seminar

The work from this research (whilst in progress) was presented for peer review as part of the 'Discussions Around the Research Table' (DART) seminar series, which presents research by students and staff of Grays School of Art at RGU during April 2012. Introduced and chaired by Dr Jon Pengelly (00.00.00 > 00.04.20), the researcher outlined notions of post-physical printmaking including work with augmented reality 'prints' (00.04.20 > 00.31.37). Dr Daniel C. Doolan, Mobile Interaction Group

(MIG), School of Computing IDEAS⁵⁹, made a presentation on their current work in augmented reality Part 1 00.32.57 > 00.44.34. & Part2 00.55.52 > 01.16.06. The video of this event is available on the accompanying DVD No2 Video Resource Dart Seminar 11/5/2012⁶⁰.

The seminar also included a practical demonstration/workshop (00.44.34 > 00.52.50) in augmented reality using prototype augmented reality artworks (see Figure 81 above). Led by the researcher using mobile devices it facilitated the participant's use of their own devices in the experience of the augmented reality works. Given this was the first public engagement with the augmented virtual print form, the initial response of the audience was encouraging. From a general level of no previous experience, participants quickly adopted and explored the installation and provided positive feedback on it. This event provided the stimulus to develop the model fully through the work of Research Probes 3 and 4.

The presentations and demonstrations were followed by a discussion session (01.16.06 > 02.01.57) which explored questions surrounding: the possibility of a common digital language between art and technology, the effects of technological mainstreaming, ideas of data, image and geo-positional shadows and the subsequent issues raised surrounding surveillance and privacy.

The round table discussions on common digital language between art and technology in part led the researcher to consider the emergence of a digital 'lingua franca'. This concept was supported by further contextual review and discussions in the later 'Exposition Seminar and Discussion Group'. Discussion surrounding technological mainstreaming, ideas of data, image and geo-positional shadows provided the research with a clear indication of the significance of these elements. The researcher was able to draw on further examples contributed by the participants and gauge their levels of

⁵⁹ Institute for Innovation, Design and Sustainability

⁶⁰ Also on line at <http://youtu.be/poGSTGSYNgk>

concern and/or acceptance. The contribution being made through this work was clarified for the researcher with the development of ubiquitous image recognition.

The effects of digital mediation on the framing of artistic practice were also raised, which led to discussion about the archaeology or legacy of data beyond the demise of the technology used to afford access. The researcher believes this area will be a future area of debate as digital legacies extend beyond the life spans of the creators. Notions of digital objects conforming to Duchamp's concept of the ready-made were raised and this became instrumental in the researcher's exploration of indexicality. Further discussion focussed on the question of 'digital' being a medium or a tool, the re-emergence of 'making' and hand crafting through the medium of social media and online selling and concepts of fixed and un-fixed art. This echoed the observations and reflections provided by practitioners and print workshops in the qualitative research undertaken for this research and the contextual review, providing a valuable triangulation of the validity of this discourse.

4.2.5 'Probes' Exposition

The practice-based research conducted in this study was presented for public and peer review through exposition in the Exhibition Space of the Georgina Scott Sutherland Library of Robert Gordon University 26th October 2012 to 18th January 2013⁶¹. The exposition was curated with the Robert Gordon University Art and Heritage Collections team.

⁶¹The closing date was subsequently extended to mid February

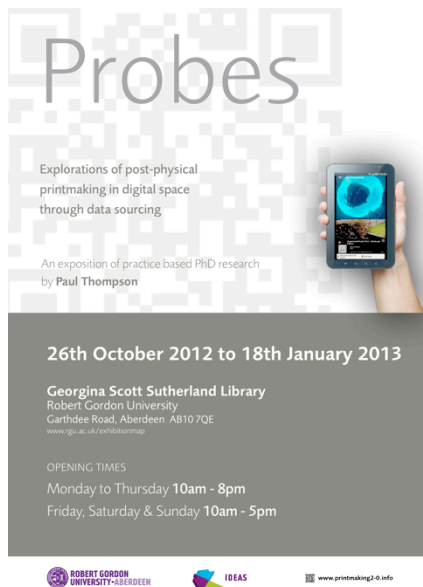


Figure 82: Exposition Poster



Figure 83: Exposition entry

The research carried out on the four 'Probes', Probe 1 'born digital – new materialities' digital print exchange was shown using a Microsoft surface, ten printed examples from the portfolio and an exposition panel (see Figure 84). Research Probe 2, 'Code as process' explorations of temporality, was presented as an installation of two computers, a colour laser printer and an interpretation panel (see Figure 85). Percipients were invited to interact with both resolved works of this Probe - Kinetic 1 and Objectile 3. This was a live deployment of audience manifestation of the print forms from Deleuzian objectile constructs (see Section 4.2.2.).



Image courtesy George Cheyne RGU

Figure 84: Research Probe 1 'born digital – new materialities' digital print exchange



Figure 85: Research Probe 2 'Code as process' explorations of temporality

Research Probe 3 The print as portal: augmented reality optical/image recognition experiment was presented as large format digital prints editioned by the University's digital print facility (see Figure 86). The audience were invited to experience the extended contexts of these works using their own iOS or Android devices supported by an interpretation panel. Probe 4 'Picture Space: Walking in a Garden of Forking Paths' was presented as an indoor interpretation panel and an instruction leaflet inviting the audience to walk outside the library and experience this work. Interestingly the work could also be experienced within the exhibition space due to its glass roof (see Figure 87).



Image courtesy George Cheyne RGU

Figure 86: Research Probe 3 The Print as Portal: augmented reality optical/image recognition experiments.

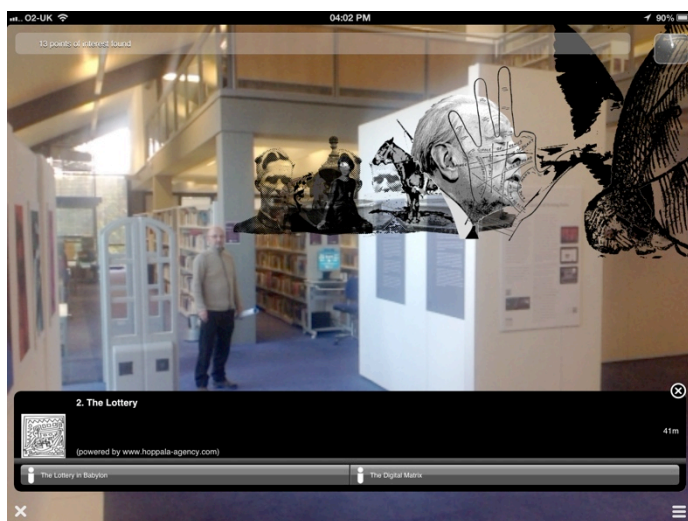


Figure 87: Research probe 4 'Picture Space: Walking in a Garden of Forking Paths'.

As a planned output from the exposition, an Exposition Seminar and 'Expert' Discussion Group was held with university staff and final year students of the Printmaking and Visual Communication courses. Led by the researcher the event comprised a guided tour (Figure 88) of the exposition, a presentation of the background and context of the work, a discussion group (Figure 89) and a facilitated survey session.



Image courtesy George Cheyne RGU

Figure 88: Exposition - guided tour



Image courtesy George Cheyne RGU

Figure 89: Exposition seminar and discussion group

Nine participants in the discussion group provided responses in the facilitated survey session and they all said they were users of social media/social networking. Only two indicated they had not used social media or networking in the creative practice. Those who had used social mechanisms in this context cited research, collaboration, promotion, and curation as their focus. There was certain evidence of 'blurring' where social media was being used as a website, this was supported by the researcher's subsequent review of Facebook pages amongst the print community. Significantly one respondent identified social media use in new modes of practice, they said their current exhibition was promoted through social media and they were also using this same media to promote audience participation:

"Extending the project and hopefully creating a 'trend' inspiring others to carry on my initial ideas/project and watch it adapt through

others' interpretation, all documented in social networking" (Survey-Respondent, 2013').

Two participants cited the appeal of publishing their work to a global audience and subsequent possibilities for global collaborative working. This provides further backing to concepts of social media forming a collaborative, collective and live mechanism for creative practice.

Participants expressed a range of opinions on the permanence of work, reflecting common themes to those of the earlier artist survey. The balance between limited edition and preserving originality was identified in respect of perceived issues of ubiquitous availability leading to a loss in value. However another respondent highlighted: "the printmakers' work could be accessed forever if digital; unlike physical prints which could be destroyed, lost or damaged" (Survey-Respondent, 2013'). Although the loss of material and haptic qualities was cited it was also countered with the view of this being a new way of working.

When asked about the physical or material nature of the work it was recognised that, although there should not be, there is a perceived difference between digital and traditional practice. Further responses indicated that generally digital methods were used as a tool or part of their process. Interestingly the lack of 'digital confidence' amongst the group was greater than the researcher expected.

When questioned about the effect of digital processes on authenticity of the artwork, one respondent was clear that they "... would expect them (artists) to have signed the print". The majority of the group reflected there may be problems with copyright, with no definitive way of knowing if the work was authentic. Participants suggested that digital editions should be authorised in the same way as traditional ones, although they thought it would be much more difficult to control. Again, loss of value was cited due to the possibility of quick and easy 'multiplication'. Allocation of ownership was also considered to be much more difficult in digital scenarios.

When asked to think of the positive benefits of using social media for promoting and distributing their work; participants were generally agreed that the potential for worldwide promotion and exposure of their work was appealing, citing it was much easier than getting 'into a physical gallery'. One participant added the caveat that "the fact that everyone is doing this makes it less effective. You are one creator in a sea of creators" (Survey-Respondent, 2013'). Further disadvantages cited were intellectual property theft, the notion of over-proliferation leading to 'visual spam', the lack of physicality and materiality and that not everyone uses social technology.

The participants' responses to the possible boundaries between physical and virtual or post-physical printmaking revealed concern as to the loss of material 'Aura' or status of the artwork. There was recognition of new possibilities and one respondent thought:

"... the line between printing and digital is becoming less and less. I personally can appreciate both physical and digitised art it's about the work behind the piece ..." (Survey-Respondent, 2013').

Another identified:

"Traditional prints may involve various techniques required to accomplish a finished product. Decisions on the size of the edition may have to be taken early on. A digital print can be printed indefinitely as long as the technology permits. It should follow that traditional print methods hold a greater value." (Survey-Respondent, 2013')

Overall participant responses reflected those of practitioners in the broader community. Given that the printmaking-based participants were engaged in a traditional printmaking programme of study, the tendency towards traditional considerations of materiality and the edition was understandable. Belief in the significance of emergent digital forms and practices was seen as positive and desirable on the one hand and an area which was both worrying for participants and one in which they lacked confidence in their own skillset on the other. (The raw data from this survey is presented in APPENDIX IIId Survey results from Exposition Seminar)

4.3 Social Media – conversations in digital space

Social networks became 'a research tool' in addition to being a subject of study in the research, as in Section 3.2.1.1 Networks as a research tool. Social networking mechanisms became a means of data collection and research output, or conversations in digital space.

4.3.1 Data collection

The range of printmaking related online groups and social media sites during the period of study comprised 21 groups with over 24,269 members, although it is worth noting how they change over time, as in Table 2 List of Printmaking Related Social/Affinity Spaces (p.56). Prior to April 2010 the NING network for creating custom social networks provided a free service which, due to restructuring of their business model, began to charge for hosting these networks after this period. Consequently a number of networks have now been deleted, however in the case of Inkteraction, Print Universe and Artists Books 3.0 significant increases in membership have been observed in the ensuing period (43%, 40% and 79% respectively). Facebook initiated changes to 'groups' during mid-2011, which archived existing groups and migrated them to the new group format. During this process the group network and its membership were lost, unless group administrators manually migrated their membership. So the apparent size of groups appeared to decline significantly in some cases post 2011. Although participant activity continues in these groups it is at a reduced level, correspondingly activity on Facebook has increased.

This study resulted in the presentation of a paper to the ATINER⁶² 3rd Annual International Conference for Fine and Performing Arts, which dealt with the impact digital culture, Web 2.0, online networking and e-culture, is having on contemporary printmaking practice, modes of collaboration, distribution and consumption. It examined developments in social networking and affinity spaces that have seen the creation and promotion of

⁶² Athens Institute for Education and Research

new affinity groupings or engaged networks from the perspective of critically engaged practice and proposed a 'virtual atelier' model. The published paper may be found as Public Output - Paper - Social Networking and Affinity Spaces in Printmaking2.0 a Portfolio of Practice⁶³

⁶³ May be found on the accompanying CD or <http://www.atiner.gr/papers/ART2012-0076.pdf>

4.3.2 Conversations in digital space

4.3.2.1 Research Journal

During this study the researcher has maintained a regular online research journal⁶⁴ as illustrated below in Figure 90.



Figure 90: Research Journal

The journal was an on-going reflection of activities in the project and was made available for public viewing in 2011. It provides an ongoing insightful dialogue, grounding the research in a publicly accessible form.

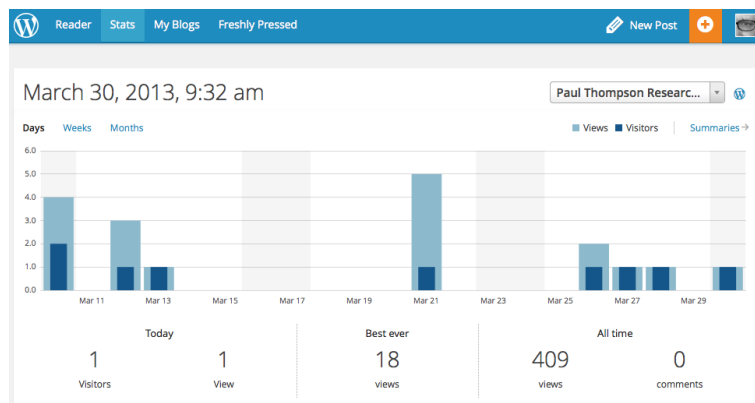


Figure 91 Journal views since 2011

⁶⁴ <http://paulthompsonsjournal.wordpress.com/>

4.3.2.2 Inkteraction page

The researcher used the printmaker's social network Inkteraction for substantial periods during the research, (see Figure 92 below). With 7,593⁶⁵ members this network provided a significant resource for peer conversation.

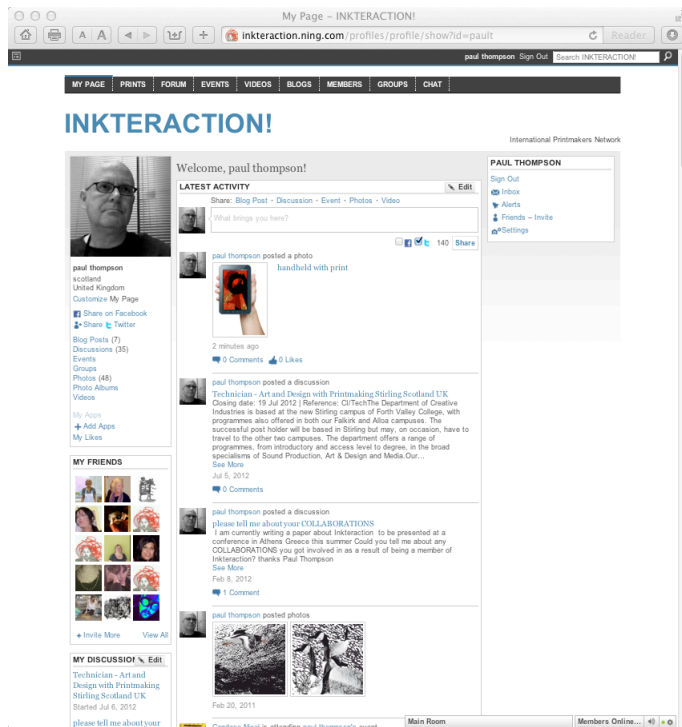


Figure 92: Printmakers social network

Inkteraction was created by and for affinity groups and this results in greater focus on common endeavour in its structure and content.

4.3.2.3 Facebook

Begun during the phase of Inkteraction when its future was in considerable doubt (due to the 'monetisation' of its host), Facebook (Figure 93 below) became an additional means of 'peer conversation' and has now replaced activity in the former to a significant extent.

Although elements of affinity are prominent, common endeavour is not a primary function; as Facebook has evolved facilitation* of 'common

⁶⁵As of 30 March, 2013

endeavour' and other elements of 'affinity spaces' have developed through 'groups' and 'chat' features.



Figure 93: Facebook

4.3.2.4 Twitter

The researcher's twitter account @practicenotes was used predominantly as a diary of events in the research's practice-based activity. The 'feed' was then incorporated into the research journal (see 4.3.2.1 above)

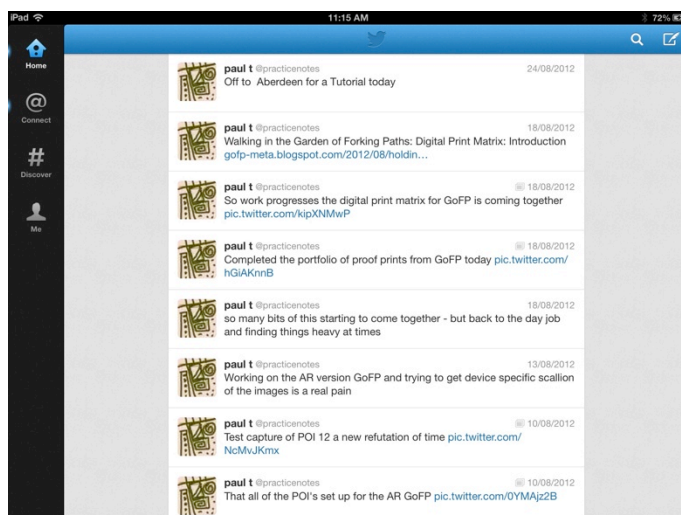


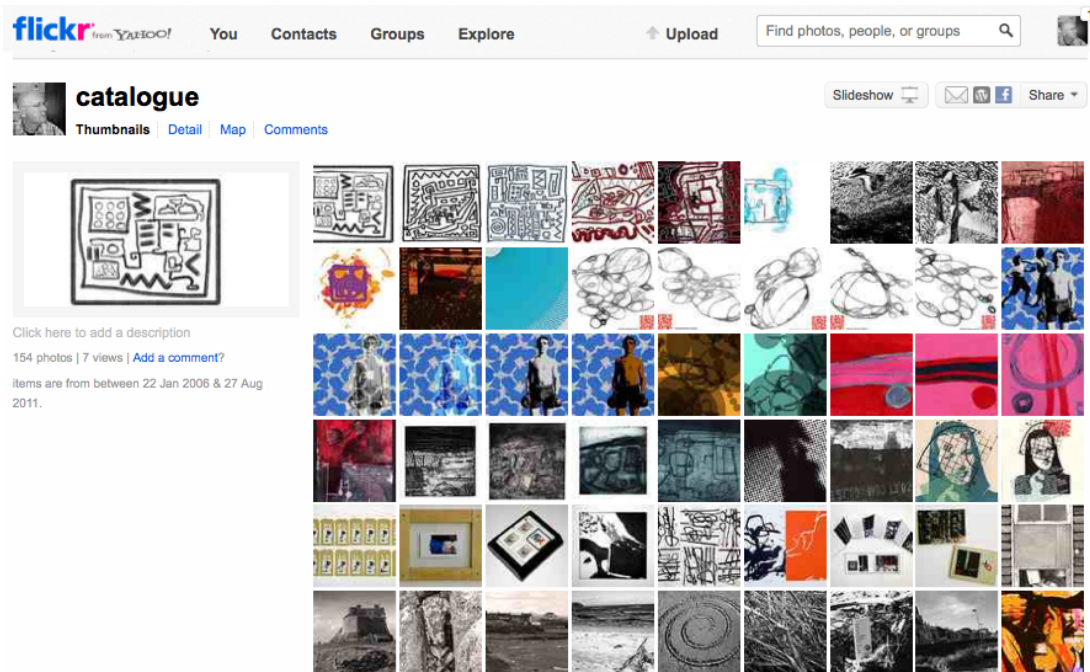
Figure 94: @practicenotes twitter journal

The immediate and focussed nature of Twitter's structure led to its use as a means of output. It was less significant as a conversational mechanism,

although some peer response on technical issues was elicited during the period of activity.

4.3.2.5 Flickr

The researcher's Flickr account has formed a primary means of peer conversation and public output since its inception, it has received 11,989 views.



Flickr as seen here has evolved into a user driven online community founded in image hosting and sharing. It is an affinity space inherent with features of common endeavour, organisation, content generation and interaction.

From its inception, a significant feature of the enquiry has remained grounding the research in the printmaking community. This resulted in adopting the same social networks studied as a means of reporting progress and development to the communities in the research. The social networks used here have formed a cultural mechanism, which became highly significant in the research. 'Conversations' were held with people from widely dispersed locations. Resident in 'affinity space' (as identified by Davies after Gee) the researcher was able to link with individuals in networks which 'transcend time and space' through flexible diffusion

structures in populated digital spaces, inherent of expanded concepts of peer-to-peer discourse over time and distance.

5.0 Discussion

This research has examined how printmaking is redefined by rapid developments in the application of digital processes in making and understanding the cultural shifts from greater digital practice and participation. The enquiry was part of the researcher's activities as a practitioner in the national and international printmaking community and explored Printmaking2.0's physical and temporal parameters contextualised against contemporary printmaking practice.

It pinpointed differences between concepts of materiality in traditional and digitally mediated printmaking practice (Printmaking2.0), as identified in Section 2.3 Materiality and signature in post-physical practice. Traditional views of art prescribe a relationship between medium, materiality and genre, which with the advent of postmodernism has become increasingly eroded (Buskirk, 2003'). Contemporary printmaking comprises both analogue and digital process, resulting in physical outputs based in traditional concepts of the edition. Although it is accepted the traditional (analogue) printmaker continues to have concerns for materiality in their practice. In considering current forms of digital printmaking using archival inkjet systems (an electromechanical matrix) these, although using new technologies, remain couched in the language of pre-digital printmaking practice. They are founded on notions of 'the standard rules of signature', 'archival quality', 'limited edition' and 'master printer'. As such 'Remediation', 'Hypermediacy' and 'Immediacy' (Bolter and Grusin, 2000') may be extended into this wider discourse and the application of analogue ideas in the digital dimension prevents us from successfully reframing our views of digital practice. Adopting styles "of visual representation whose goal is to remind the viewer of the (former) medium" (Ibid) are deflectionary.

5.1 Materiality

Digital tools are now commonplace and have an established and common language of practice, a digital 'lingua franca' which has been democratized by "access to powerful software tools for creating, editing and manipulating

digital content” (Naughton, 2012b') The internet has provided ordinary people with ways of publishing what people produce with those tools. The foundations of post-physical practice have been established through these tools and ubiquitous access to digital audiences via the internet; exemplified by 'citizen practitioners' (Schön, 1983') commonly creating and sharing geo-located, meta tagged, digital photography and text through social networks. Mobile technology and the ever-present internet is now blurring virtual and physical realities through the emergence of functional augmented reality mechanisms.

The printmaker using a 'digital matrix' has the potential for new 'post-physical' practice(s) and for making post-physical forms, which require new approaches and aesthetics. The practice-based 'Probes' and resulting aesthetics suggest these new practices are resident in a merged 'digital space' as defined by Kilian, these augmentations involve the layering of virtual information over the physical. As such this 'layering' becomes a natural extension to the 'language of layering' of the contemporary fine art printmaker and places these practices in the domain of a second generation of printmaking rather than the wider fields of digital or site-specific art. The 'research probes' support these concepts, in which the virtual layering of the 'prints' as a tangible combination of virtual and physical objects and the impression of digital on physical space reflect the potentials for the augmented print.

The research probes also explored notions of the digital palimpsest⁶⁶ in which the artist may push and pull at the digital medium, instancing (printing) to digitally mediated materiality where the print art object has shifted “from the physical to the temporal” (Corcoran, 1996' 375-378). A condition also reflected in the work of artists who contributed to the Digital Print Exchange; Alastair Clark's projection work, Bren Unwin's installations and Deborah Cornell's virtual reality projections.

⁶⁶See Figure 9: The digital palimpsest., Section 2.3.2

The Beddington Report identifies "simple categorisations based on traditional notions of identities are likely to become less meaningful." (Beddington, 2013b') As a consequence of the blurring of online and offline living through social networking ideas of authenticity are being redefined (re-tweet culture) and, rightly or wrongly, online presence is often taken as signature. Signature has undeniable significance in printmaking practice, however some of the artists surveyed were strongly against it, some were quite traditional and a few foresaw the possibilities of digital signature. Interviews amongst the print workshops elicited an adherence to traditional values in editioning and signature with little recognition of digital mechanisms. New challenges to traditional concepts of signature in post-physical printmaking practice may require further exploration. The research probes explored post-physical ideas of signature through signature of medium, meta-data, provision of direct and embedded access to the artist's profiles and permissions through both mechanisms of proprietary digital signature (Probe 3.1) and development and application of augmented reality signature (Probe 3.2).

The balance between 'artistic integrity' and 'commercial value' presents a dilemma for artists. A situation which is potentially amplified in digital space, with surveyed artists, studio stakeholders and participants in the exposition seminar group voicing concern over their work being copied. This concern may be associated with traditional concepts of an art object's ascribed value, whereas in Printmaking2.0 concepts of deferred originality "ascribing value not to the object itself but rather to its circulation" (Judovitz, 1995') for the 'documented copy' resident in a 'pull' media ecosystem. This argument can be supported by a general consensus as to the validity of digital evolutions including public and private screen based systems, ePublications and the results of the researcher's own practice [Probes].

5.2 The digital medium

Since the beginning of the 21st century the emergence and adoption of social networking clearly evidences digital adoption of the new e-cultural modes of engagement, including participation and collaboration. This research explored whether participation by the printmaking community was

any different to the general community and if those who participate are more likely to be from a 'digital' grouping. Study of the social networks used by printmakers revealed significant adoption from the general printmaking community (in particular Inkteraction with 7,000+ members and Facebook), the general thread of collaborative exchange being focussed on traditional printmaking practice. In "Social Networking and Affinity Spaces - the virtual atelier" (Pengelly and Thompson, 2012') these networks have (it is proposed) established a "virtual atelier"(Ibid) in which the conditions for Deuze's digital culture and Davies's affinity spaces coexist with participation and collaboration. This was supported by digital participation and collaboration scoring highly amongst artist survey respondents; with information exchange and discussion being the primary form of collaboration undertaken, which is, most likely, a reflection of the medium of the available social networks. Although the studio stakeholders interviewed recognized personal membership of the printmaker's networks such as Inkteraction, none had (at that time) used it corporately whilst a number cited the significance of Facebook in promoting their activities in preference, given the opportunity to access a 'purchasing public'.

Given the established modes for the; circulation, presentation, distribution and consumption of traditional 'fine print' through the gallery/publishing system. Contextual review revealed a series of identifiable key survey exhibitions of art made through the digital medium (see 2.4.1 curating the digital), which provided establishment recognition of the digital medium in the artistic context and evidenced greater curatorial consideration of the digital. However the consumption of digitally printed works still appears to face resistance in some quarters⁶⁷ (see also Section 4.1.2.2.1. Post Physical Forms).

⁶⁷For example the call for the La Calaca Press III International Print Exchange 2013 specifically cites "No Digital Prints or Photocopies" (<http://www.lacalacapress.com/2013/05/call-for-printmakers-la-calaca-press.html>) And the call for the 2013 Printmaking show at Amarillo Museum of Art cites "Eligible artworks include hand-pulled prints created with intaglio, lithography, relief, serigraphy or experimental methods." (http://www.arts.texas.gov/jobs-opportunities/call-for-entry-printmaking/?doing_wp_cron=1368788682.7140591144561767578125)

It is evident through the academic discourse of Graham, Muller and Edmonds, Vershooren and Whall and manifest in the activities of the Digital Art Museum and the Los Angeles Centre For Digital Art with their physical and online exhibitions, that online curation and exhibition is becoming a significant context for the digitally mediated artwork including those with familial relationship to printmaking. This is supported by "Economics & The Immaterial" the current post-doctoral research by Nora O. Murchú which asks "How do we give value to immaterial goods?" and "How can curators and artists create new platforms and models for the creation of economic exchange?" (OMurchú, 2013').

Exploring modes of consumption through artist survey provided a generally negative response to digital distribution and consumption, with any positive responses tending to focus on the collaborative curation of physical print exhibitions and exchanges. The survey of artists about the uptake of proprietary online market places produced low responses, which were negative in opinion. Amongst the workshops and studios studied the use of digital mechanisms in curation was strongly supported, but generally from the position of the management of physical shows and collections. Establishment of digital databases and archives was highlighted while online selling resulted in mixed reactions. Some had tried to establish their own systems and were participating in a nationally organized sales outlet, but none were involved in the social networked based online sales media (Etsy for example).

Evidence from contextual review, surveys and interviews showed the digital medium was being used for participation and collaboration and, to a limited extent, for distribution and consumption. Research Probe 1 the 'born digital - new materialities' digital print exchange was designed to elicit controlled responses to these same questions; this research probe established a new group of 49 artists recruited from a variety of other networks (Facebook, Flickr, Inkteraction, Siggraph) and worked with them to curate a digital print portfolio. The researcher then collaborated at a distance with others (OpenAir/RGU Library) in publishing and distributing the portfolio. The

works were made available in multiple forms dependent on the recipient's status as contributor (high resolution printable) or general audience (screen resolution, not printable). Meanwhile Research Probes 2, 3 and 4 explored a second generation of practice, in which the transference from originator to audience is no longer one directional but becomes a socially mediated dialogue, in which the separation of the artist and audience becomes blurred. Probe 2 showed a collaborative relationship in editioning the print, Probe 3 concepts of the spectator gaining 'live' access to the artist through augmented signature and Probe 4 allowed the spectator to become active in the augmented print-form itself. The researcher was able to exploit established international multimodal-networked systems, social networks and affinity spaces to create common creative repositories capable of instantiation and re-instantiation via commercial digital repositories and a university repository to examine and prove these concepts.

5.3 New printmaking

Exploration of post-physical printmaking from a digital matrix was based on the researcher's previous and ongoing experience as a digital artist/printmaker, supported by Kushner's argument that "... a print does not need a fixed matrix nor does it need to be a piece of paper physically pressed against a template". The erosion of traditional printmaking concepts (based in the physicality of the print matrix and its archival impression to paper) is seen through the emergence of digitally mediated practice, resulting in separation between representation and instantiation. Results from the artist survey and studio interviews revealed a mainstreaming of digital origination and output technologies in both studio and personal contexts, reflecting an emerging 'digital lingua franca' and a larger uptake of digital printmaking in studios amongst these 'digital natives' (Prensky, 2001' 1-6). However this emergence, development and acceptance of digitally mediated printmaking to two and three dimensions still draws a range of responses, from wholehearted acceptance as a printmaking process in its own right, to acceptance as a possible tool in traditional practice (see Sections 4.1.1 Surveys p.127 and 4.1.2 Interviews p.140).

Significant 'academic discourse' surrounds the perceived dialectic between traditional and digital printmaking, founded on the use of digital mechanisms as tools in the production of traditional print forms rather than embracing the full potential of digital mediation and practice. Notable voices such as Barfield, Gollifer and Thirkell have identified: a decline in the significance of the 'hand-made print on paper' (Barfield et al., 2001') in the milieu of ubiquitous digital communication and in digital instigation, mediation and distribution of the art form. Set in a context that Gollifer, Deuze and Beddington suggest is witnessing a redefinition in cultural terms which, as Gollifer suggests, may affect the "boundaries commonly associated with the activity of fine art/printmaking" (Gollifer, 2005') and the capacity for digital technology "to pull together mediums from diverse backgrounds and combine their characteristics creatively using methodologies once common only to print" (Thirkell, 2005'). The artists and interviewees were less concerned with academic discourse. This area received one of the lowest response rates, perhaps because of their focus on practical concerns in image making. The only academic discourses the respondents identified were those surrounding 'what is a print?', 'authenticity' and 'reproduction'.

'The technological context' permits the application of Naughton's theory, that digital technologies allow us to "do new things hitherto impossible" (Naughton, 2012b'). This may provide the technological foundation for the creation of new forms of printmaking (see Figure 24 p.69) which are conceptually modelled on Sterling's predictive notions of 'future objects' see Table 3 p.72. These concepts informed the practice-led research probes exploring emergent forms in post-physicality via code as process, augmented reality and imprinting digital space onto physical space. The Probes were able to exploit emergent technological activity in augmented reality and portable devices in the application of the 'Junaio' and 'Layar' platforms, to post-physical printmaking practice in Research Probes 3 and 4. Significantly this area shows signs of commercial evolution in the shift from open source to monetised versions of the systems and applications used. Although the technology is emergent and at times volatile, a pattern of mainstreaming augmented reality and a greater alignment with physical

commercial print is emerging, suggesting significant adoption. Overall the expansion of augmented, mobile, ubiquitous and networked personal communication provides the most significant technological context to the evolution and practice of a second generation of printmaking. A condition reflected in current innovative 'artistic practice'.

David Hockney and John Goto's recent smartphone centred digitally mediated practice provide examples of emergent practice that moves beyond 'permanent physical form' to instantiation. These encapsulate the potential for editioning through Beddington's conception of 'hyper-connectivity' via 'mobile technology' and 'internet ubiquity' to audiences "constantly connected across many different platforms" (Ibid). It is the potential for post-physical form and ubiquitous 'pull' on demand which separates Printmaking2.0 from traditional forms, including those originated through digital mediation to a physical state. Within this context Probe 2.1 'Kinetic 1' successfully used direct coding and, although appropriate to the researcher and other practitioners with similar experience, its order and structure would not normally be recognised by traditional printmakers. Whilst Probe 2.2 'Objectile 3' used a 'Flash' layering structure, recognisable as having a relationship to layering in more traditional forms of printmaking practice. Probes 3 and 4 applied new technological contexts with new concepts of layering in a virtual context, where a virtual layer is augmented to the physical prints of Probe 3 and to physical space in Probe 4. These 'Emergent Forms' have realised William J. Mitchell's prediction of "new layers of meaning" (Mitchell, 2005') in 'always on' places and spaces imprinted with new layers of meaning, within and beyond the physical print form through 'augmented reality'.

In part, the 'transition to new printmaking' represented by fluid permanence and reversible process lies in the context of the paradoxical nature of printmaking; wherein on one hand it is a practice defined by tradition, but it also wholeheartedly pursues innovation while continuing to struggle, it seems at times, with an inferiority complex resultant of being perceived as 'reproductive' and its relationship with singular art forms such as painting. The sample surveys of artists revealed that concepts of fluid permanence

and reversible process might be seen as a positive feature of digital working and thus may be viewed as a marker of transition. However, concern for the artist retaining their aesthetic control in digital processes and retention of copyright/ownership was apparent.

Concepts of fluid permanence and reversible process whilst recognised generated differing responses amongst the studios and workshops. Although the fluidity in experimentation as part of a traditional print production process was accepted, consideration of post-physical forms was limited. Again a generational difference toward 'fluid permanence and reversible process' amongst the members of the studios was reported, supporting the idea of a 'born digital' generation of printmakers.

In the transition to new printmaking with its inherent 'fluid permanence' and 'reversible process' which defines Printmaking2.0, this research concurs with Manovich's argument of focussing more on the "experience of the human subject in augmented space" (Manovich, 2005a p.2) than the augmentation technologies themselves, "re-conceptualising augmentation as an idea and cultural and aesthetic practice rather than as technology" (Ibid). In the 'experience' of augmented spaces and print art objects the notion of index might be considered and "the way that it operates to substitute the registration of sheer physical presence for the more highly articulated language of aesthetic conventions (and the kind of history which they encode" (Krauss, 1977a, p.81). Krauss in 'Notes on the Index Part 1' conceives the "panorama of the index" with reference to analysis of Duchamp's 1918 work "Tu m' " (Krauss, 1977a p.70-71) which serves as a useful tool in framing this argument and the reading of both contemporary mixed media multi-layered prints and now digitally mediated augmented reality printmaking.

In the Probes presented here the works are located in "the continuum between the real/physical and the digital/virtual environments or spaces" (Milgram and Kishino, 1994) and "a panorama of the index" (Krauss, 1997) is presented through artistic constructs and virtual ready-mades. Each are an indexical sign or portal to the extended contexts of the art work itself in

the augmented reality domain. In these extended or augmented dialogues between the audience and the indexical (mediated print 2.0 object), the relationship necessitates working at a personal level through the audience's personal digital space, with the Research Probes providing examples of this.

5.4 On indexicality

Ongoing investigation of the implications of virtuality on reality, as suggested by Bryant and Pollock, has led to the revisiting of the 'trichotomic formula' of semiotic signs: index, icon and symbol provided by C.S. Peirce (Bryant and Pollock, 2010'). Discussions surrounding the effects of virtuality on reality in the digital photographic medium have focused on index and the fundamental relationship between "the signifier (word/image) and the thing signified, because both existed at some point within the same physical space" (Sturken and Cartwright, 2009') and conception of the analogue photographic print is seen as true and real. In photography digital technology "theoretically disrupts previous notions of the indexical connection between photographic images and 'reality'." (Dzenko, 2009' 19-23) and conform to Peirce's notion of an icon. Equally this may be applied in the context of printmaking and the relationship between traditional (analogue) and digital practice, Notes on the Index Part 1 suggests:

"... the index must be seen as something that shapes the sensibility of a large number of contemporary artists; that whether they are conscious of it or not, many of them assimilate their work (in part if not wholly) to the logic of the index." (Krauss, 1977' 58-67)

Examples of this lie in significant numbers of works submitted to the digital portfolio, Research Probe 1, 'born digital – new materialities' (Thompson, 2011') and illustrated by the works of Bytautas, Gates-Stuart, Henshaw, Bliss, Gallagher & Stark and others. The index in its expanded context as defined by Krauss forms a significant element of Printmaking2.0 and the index forms the link to the meta-texts behind the immediately perceived art object. Theoretically the index may be considered as a form of 'augmentation' in its general sense and indicating that the index be considered in the context of the post-physical, virtual prints formed through Printmaking2.0 using 'augmented reality'.

5.5 The digital print art object: defining Printmaking2.0

The new physicality of e-surfaces and augmented reality possible through ubiquitous “hyper-connectivity” (Beddington, 2013b) are engendering ‘emergent forms’ of printmaking. These forms are a result of new concepts of imprinting within physical/virtual hybrid space and sited in the ‘lingua franca’ of digital culture and practice. In which traditional ideas of the limited edition and analogue philosophies of ‘Aura’ are no longer applicable.

Response from surveys and interviews revealed a strong concern about perceptions of the ‘quality’ and ambience of both traditional and digital printmaking. Response to direct questioning about ‘Aura’ depended on the individual’s perception of digital as a tool or a medium. Respondent-17 identified “Walter Benjamin describes the loss of the “hand” but the hand can work in different ways in the computer, it’s just another tool that artists use.” Whilst Respondent-16 offered:

“Benjamin was from a different time when these ideas of reproduction were less integrated into the fabric of culture. I hope that one of the positives of digital media is that we have revised this notion of ‘Aura’ and perhaps tossed it aside altogether.”

Studio interviewees suggested that with increasing acceptance of digital print there is an associated ‘new Aura’, but this may be more a shift in connoisseurial perception rather than a change in ‘Aura’. Peacock suggested that ‘Aura’ is a result of the artist’s involvement. Results of contextual review suggest the emergence and development of a digital society, as discussed by Negroponte and Prensky and qualified by Beddington, reflects Benjamin’s conception of a ‘major historical period’ accompanied by changes in the ‘mode of being of the human collective’ and its incumbent ‘sense of perception’.

The digital medium is capable of being imbued with new forms of ‘Aura’, formed of the digitally mediated dialogue between artist and percipient. The post-studio post-physical print can engage with new sense perceptions, where the digitally mediated art object carries the possibility of its own

'Aura'. Research Probe 3 illustrates it encompassing both physical and post-physical prints afforded through a digital matrix. The results of this Probe highlight the juxtaposition between physical and digital space and the potential for new forms of 'Aura'. Probe 3.2 'Four Walks @ 55 Degrees North' demonstrates the application of 'augmented reality' through the physical print form, providing a portal from physical to digital space and new concepts of 'Aura' in a post-physical context.

Digital processes provide the theoretical possibility for endless production and re-production of digital print. Qualitative research addressed this question directly: Respondent-9 suggested "Multiplicity is one of the elements of printmaking that I admire; its democratic nature is part of my practice and one facet I look to exploit". Respondent-5 believed there was "no reason why this should be a bad thing" but wondered "what value will we place on the resulting images?" (Ibid). This fosters questions on the commercial value of multiple art forms and whether the traditional editioning systems remain valid in digital practice. One of the studios, (DCA-Print-Studio, 2011'), reflected on the positive nature of reproduction as an art form in its own right, citing the work of Spero and Kruger as exemplars. In this context we may argue therefore that properties of 'multiplicity', 'democracy' and ultimately of 'open source' should have a significant place in second-generation digital printmaking. This stance would counter Baudrillard's view of the digital dimension as "hyperreal simulacra" and the potential for digital dialogue between artist and audience becomes significant.

In the digital medium and its relationship to simulacrum one should consider if digital space is to be approached as fixed or fluid. In analogue printmaking the 'source, process and product' largely become 'fixed' at the point of impression. In digital space 'source, process and product' remain unfixed, as explored through the research probes; permitting concepts of the real juxtaposed against those of the virtual, with the temporal state of the 'print' shifting from absolute to relativistic, a "Spime" (Sterling, 2005') rather than a "third order simulacrum" (Baudrillard, 1999') or "imitation of imitations" (Macey, 2001'). These are prints resident in a digital matrix until

'pulled' into virtual impression by the perceiver. This establishes a virtual collaboration (reminiscent of an artist printmaker collaboration) between artist and percipient, in the editioning of the post-physical print through the application of 'pull media*' within the percipient's personal temporal digital space.

Exploration of the contributing artists' perceptions on materiality and permanence revealed an emphasis on the question of ink permanence, in relation to archival quality digital printmaking to paper (inherently digitally mediated traditional printmaking). Respondent-11 however highlighted the belief that "criticism (of the medium) came from printmakers, art schools and galleries marketing 'fine art' prints" and that "... they all had a vested interest in discrediting this fabulous new medium" (Ibid). Within the Workshops and studios the permanence of digital prints is believed to now be largely resolved, citing that the inks are now high pigment and tested and the papers used are traditional fine art papers. One studio argued this is more than the case with traditional inks, which are taken on trust because they are traditional.

The qualitative research gathered little information on perceptions of new forms of materiality. Contextual review revealed that traditional printmaking practice views materiality and permanence as two of the key constituents of printmaking practice, akin to commercial value in this sense. Examining new forms of materiality means dealing with print forms which are potentially temporal, disembodied and spatial (imprinted from virtual to physical space) putting the post-physical print beyond concepts and values associated with the traditional print form. Consequently the research probes were designed to explore new concepts of 'materiality and permanence'. Probe 2 explored new manifestations of form from Deleuzian objectile constructs where each engagement constitutes a unique copy, shifting the spectator to participant. This allows them to engage and re-engage with the art object in a condition of 'fluid permanence'.

Probe 3.1 explored 'new materiality' through image-based recognition which provides the potential for a post-physical or virtual layer beyond the

physical layers associated with analogue print. Probe 3.2 explored materiality and signature through development of fluid permanence/reversible process to establish an objectile digital print matrix, its deployment and authentication through post-physical signature. Probe 4 explored new concepts of materiality and permanence through the new physicality of electronic surface instantiation from 'digital space' as post-physical, multiple and simultaneous forms founded as temporal constructs in a non-linear, relativistic time model. In this Probe the printing process transferred from analogue to digital, from physical to virtual and the gallery space from traditional to 'new (digital) architectural space' (Freeman, 2012'). Thus materiality is now proportional to the print's temporal existence, set against its potential for variable but repeatable instancing/re-instancing. Permanence has become fluid, reversible and repeatable with each instantiation being a unique copy printed collaboratively with the participant.

Responses to exploration of 'instantiation and temporal form' amongst the studios and workshops tended to focus on the potential to only print what was required at that time, with the working process likened to etching. This was associated with a cause for concern in understanding 'what constitutes a digital edition?' One studio revealed it was beginning to explore new questions surrounding digital printmaking practice printing two sizes of a work from the same matrix. A surveyed artist cited that this is already the case in 'deviant art' for example. The overarching concern was with quality control of the edition and retaining the artist's authority. Overall however the artists' concerns tended to focus on the production of the editioned work, albeit through digital means.

New concepts around instantiation and temporal form are a key marker of the transition from traditional to digital printmaking practice. In traditional printmaking practice, as in analogue technological visual art, the notion of time is often one of either: freezing temporal representations of physical space in photography or sampling it in time-lapse film and video loops. However the digital medium presents: "... the ability to play with time, to postpone it, to quicken it" (Demos, 2007') thus digitally mediated art is

practiced in “real time systems” (Gere, 2006) in which there is the potential and demand “for instant feedback and response” (Ibid). The Printmaking2.0 object is no longer imposed on a “law of constancy” (Deleuze, 2006) but becomes ‘objectile’, temporal and unfixed. Concepts explored through the ‘digital matrix’ were used with the research probes. For example, in “Four Walks @ 55 Degrees North” the prints act as portals to their original temporal, fluid, digital form; from which they are themselves instantiations.

Considerations of authenticity in the digital context are significant, in addition to concepts of instantiation. The studios and workshops and some of the surveyed artists reflected traditional concerns about the boundaries between original prints and reproductions. Other contributing artists reflected that questions of authenticity may deflect us from the real issues, that authenticity is a term that should not be used in the digital context and is the purview of the art market, galleries and collectors, not the artist.

Conceptions of authenticity are problematic in printmaking as a medium of the multiple, (as discussed by Krauss 1997, p.152) and consequently authenticity and authentication can be viewed as a product of validation. In the digital context validation may be seen in the form of traceable digital signatures or the meta-data cloud* surrounding the digital creative act. Within this context the Probes provide practice models for the use of meta-data and virtual layering to authenticate the work, an ‘embedded digital provenance’ which responds to discussions raised in Section 2.3.3 Beyond signature (p.43) of the Contextual review. Consequently the potential of post-physical layers should be viewed as a possible new paradigm which goes beyond analogue signature, for identification and authorisation of the digitally mediated print 2.0 art object⁶⁸. The provenance and meta-data surrounding the work provide “Historical-material authenticity” (Jokilehto, 2009’ 125-135) and perceptions of the society and culture in which the work resides provides for its “Social-cultural authenticity” (Ibid). What is authentic in an analogue culture can differ from what is authentic in a digital culture.

⁶⁸ Also Section 2.3.3 Beyond Signature

6.0 Conclusions

Exploring the topology surrounding digitally mediated printmaking this research has achieved its original aim having:

Examined, through the researchers contextualised practice and critical enquiry, the developing physical and temporal parameters of a post-physical, second generation of printmaking (Printmaking 2.0). As functions of rapid developments in both the application of digital processes in making, and the physical and cultural shifts in artistic practice resulting from increasingly involved and complex digital participation.

The research was undertaken by an embedded practitioner, in an ethnographic style adopting a relativist ontology, subjectivist epistemology and dialectic methodology. This research is 'of' and now contributes its findings, practice models and artistic outputs back to the printmaking community.

6.1 Outcomes of the research

In meeting its research aim this study presents meaningful outcomes from this thesis and its related academic and printmaking practice based outputs (including artwork, exhibitions, networked collaborations and published papers). The following sections speak directly to each of the research objectives, as identified in Section 1.3.2 Research objectives (p.16)

6.1.1 The new boundaries of the print artefact

Research Objective 1 examined: 'new boundaries of the print artefact's permanence, materiality, authenticity, authorisation and consumption; against the dialectic of physical and post-physical practice'. The results of this research show the mainstreaming of digital technologies, as identified by Naughton, has facilitated the development of Schön's concept of citizen practitioners in the digital domain. This provides a medium affording sophisticated digital toolsets and democratic access to printmakers and audiences, also traditional printmakers are adopting digital tools in their traditional studio practice. There is a community of printmakers, fluent in

this new medium, who are making and developing works for digital printing as a regular practice. A smaller group of print artists (including the researcher) are now questioning the physicality of the digital print and engaging with post-physical print forms including projection, virtual and augmented reality, establishing Printmaking2.0 as a new domain.

This research postulates that Printmaking2.0 and its augmented digital index (always in flux) constitutes additional virtual hyper mediated meta layering in the 'print'; unlike the practices of analogue printmaking and digitally mediated printmaking from an electromechanical matrix, in which indexical extension through layering and states become fixed at the point of impression. This 'always-on' layering conforms more closely to Krauss's idea of the 'panorama of the index', which this research suggests forms a decisive marker of transition from analogue/digital (traditional) to digital/virtual printmaking (Printmaking2.0). Although this new domain descends from traditional practice, it is sufficiently evolved to be a distinct 'new' practice rather than a sub-process or tool. The transition from physical to dematerialized or post-physical practice demands an expansion in our aesthetic perspective, from concepts of permanent objects in space to temporal experiences of virtual objects through personal digital space.

The research probes and contextual review reveal that in the post-physical practice of Printmaking2.0 traditional conceptions of permanence can no longer apply. This new printmaking has inherent fluid permanence and reversible processes afforded through post-physical working practices founded in non-linear post cinematic and televisual forms. These concepts are reflected in the practice models developed through the researcher's research probes and they are revealed in the work of innovative practitioners in the field. Printmaking2.0 works with new forms of materiality that are temporal, disembodied and spatial rather than fixed, embodied and relative. The data/image forms of post-physical print, imprinted from virtual to physical space, begin to break with the notions and values of traditional printmaking. Their materiality and permanence are fluid, reversible and repeatable. Each instantiation is a unique edition from a digital matrix, collaboratively 'printed' either physically or virtually with

the participant, (see research probes 2, 3 and 4). This digitally authorised impression shifts the artist/audience relationship toward socially networked flux, more rhizomatous than simply push/pull distribution.

These new conditions therefore engender shifts in the qualia⁶⁹ of the post-physical printform, which may be associated with conceptions of "flow" (Csikszentmihalyi, 2008') in which the transformation of time or the temporal experience becomes apparent. These components are now commonly adopted within digitally mediated affordance, gaming and interaction design, which (as Nakamura and Csikszentmihalyi identify) is a dynamic environment located within the phenomenology of person-environment interactions. It is this environment which research probes 3.2 and 4 reveal a familial relationship. Presenting the opportunity for shaping the 'affordance of experiences' resident in the hybrid states between physical and digital space; beyond a 'closed affordance' of the artist's practice towards a digitally mediated 'conversation' or 'flow' in which the print is unfixed and the participant audience member can move between its 'states' in a rhizomatous manner. Given the growing significance of the participant's experience of 'flow' within the digitally mediated interaction Cowley (et al.) propose the notion of 'universally accessible activity' which this research suggests is adjunct to the democratic accessibility of Printmaking2.0.

Within the qualia of Printmaking2.0 the non-linear, post cinematic and televisual forms expressed through moveable, editable, multiple and simultaneous layers overlap with notions of 'montage'. Leibowich identifies

⁶⁹ In the case of visual experiences, for example, it is frequently supposed that there is a range of visual qualia, where these are taken to be intrinsic features of visual experiences that (a) are accessible to introspection, (b) can vary without any variation in the representational contents of the experiences, (c) are mental counterparts to some directly visible properties of objects (e.g., color), and (d) are the sole determinants of the phenomenal character of the experiences. This usage of 'qualia' has become perhaps the most common one in recent years. Philosophers who hold or have held that there are qualia, in this sense of the term, include, for example, Nagel (1974), Peacock (1983) and Block (1990). Tye, Michael, "Qualia", *The Stanford Encyclopedia of Philosophy* (Fall 2013 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/fall2013/entries/qualia/>>.

that the notion of 'montage' as a compositional sequence has parallels in other art mediums(Leibowich, 2007'). In the framework of Printmaking2.0 this may be associated with the shift from fixed physical to virtual forms which are live and editable. A context in which this research suggests the post physical printmaker's layering of images fulfils a similar meaning. As illustrated by research probe 4, data/image forms are montaged or digitally collaged to juxtapose compositional elements into new multiples digitally imprinted through augmentation. An environment in which as Leibowich suggests we may, when thinking about digital image manipulation, consider that montage, collage and now (in the context of Printmaking2.0) 'layering' can take on new meaning. Accordingly consideration and adoption of participative digital montage or collage through layering becomes significant in the emergent qualia of Printmaking 2.0.

The research probes developed a new paradigm in a visual art printmaking context, of meta-data and virtual layering as authentication of the work in the form of embedded provenance. This development addressed questions of "social-cultural authenticity"⁷⁰ in post-physical systems and new ideas of authenticity in digital culture. Critical to these notions is that new concepts are necessary when considering permanence, materiality, authorisation and authenticity; in meeting the demands of new audiences seeking 'content' and 'experiences' afforded through mobile digital participation and social networking', resident in participatory 'flow' rather than 'push' eco-system systems identified by Naughton and others.

6.1.2 Digital participation

Research Objective 2 examined: 'the effects of digital participation through Web2.0, online networking and social media on collaboration, distribution and consumption in contemporary printmaking practice'. This research found that general digital adoption has been promoted by the rapid adoption of social networking in communities and is consequent new e-cultural modes of engagement. This reflects a maturing 'digital culture' as

⁷⁰As conceived by Jokilehto

defined by Deuze and greater connectedness between producers and consumers of cultural behaviour (Bolter and Grusin, 2000'). The study analysed current modes of networked activities and digital participation by print artists, using the social networks Flickr, Facebook and Inkteraction and revealed printmakers networks. These may now be viewed collectively as:

"a 'virtual atelier', in which, like the working practices established by S.W. Hayter's 'Atelier 17' artists work in a connected way, sharing their ideas, discoveries and achievements, but now through internet based digital networks, at a variety of levels of engagement from direct person to person communication to expanded 'digital neighbourhoods' of connectedness" (Pengelly and Thompson, 2012').

These networks afford mediated artistic collaboration through de-materialised and networked mechanisms and the printmakers engaged in these networks are fostering new models of post-physical practice in this community. Traditionally these activities were fostered via analogue means, direct person to person contact associated with the atelier's physical space. Now they are increasingly undertaken through public 'threads' in digital space, conceptually placing these activities in second-generation practice. The research revealed these networked endeavours are collaborative works in themselves, with digital participation and collaboration along with information exchange and discussion being highlighted among the surveyed artists.

Although the digital medium offers a significant platform for post-physical collaboration, its potential as a new means of post-physical distribution and consumption is less well perceived among the contributing artists and studio/workshops, nevertheless a smaller number of innovative respondents recognised the potential. The practice-based nature of this research directly examined this notion through its series of research probes.

The probes were used to explore the capacity of new forms of digital consumption and distribution and revealed that new forms of consumption can be distributed through ubiquitous networks to personal mobile e-surfaces. In addition to the distribution and consumption of ePublications

such as the 'Born Digital' portfolio, they permitted new modes of socially mediated consumption; a second generation of practice, in which the transference from originator to audience is no longer one directional but becomes a socially mediated dialogue. New mechanisms for virtual and augmented consumption of digitally distributed second-generation prints were also revealed.

6.1.3 Markers of transition

The third research objective sought to 'establish the contextual precedents of digital printmaking practice, pinpointing key markers of transition between traditional and new printmaking'. The research revealed two printmaking domains which it defines as the 'atelier types' traditional and digital, see Figure 95: Map of printmaking atelier types and domain matrices (p.222). These 'atelier types' are composed of four domain matrices:

- 1) Traditional printmaking - direct matrix
- 2) Traditional printmaking – transferred matrix
- 3) Digital printmaking – electromechanical matrix
- 4) Printmaking2.0 – digital matrix

Qualitative research confirmed that, in addition to both forms of traditional printmaking, digital printmaking through an electromechanical matrix is now a significant and established practice amongst surveyed artists and in the majority of the studios examined. It also revealed that the emergent domain Printmaking2.0 digital matrix is a developing area of practice and presents a gap in knowledge. The researcher examined this subsequently through contextualised practice in the form of specifically designed research probes.

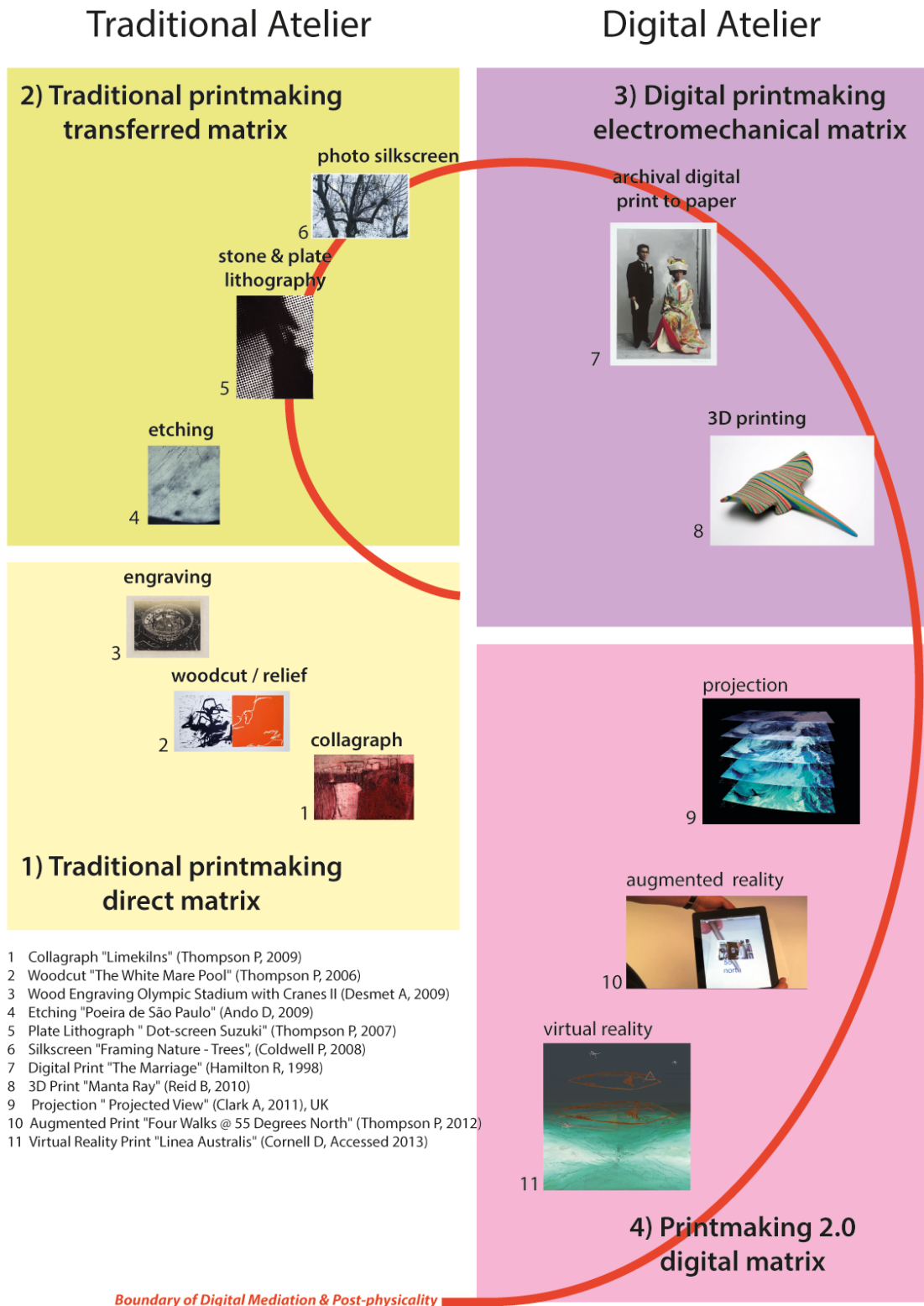


Figure 95: Map of printmaking atelier types and domain matrices

The following Key markers of transition between traditional and new practices of Printmaking2.0 were revealed in Objective 3:

- Technological developments and mass participation in ubiquitous, pervasive digital access and the affordance of personal digital space forms a critical separation between traditional practices of imprinting in a physical context and second-generation post-physical practices imprinting in virtual/digital space. This enables an entirely new medium in personal and public digital spaces through 'eSurfaces' for the digital printmaker.
- In the practice of analogue printmaking the processes of indexical augmentation through layering and states become fixed at the point of impression. In Printmaking2.0 the augmented index in a flux is formed of the virtual meta-layer[s] in the print. This conforms closely to Krauss's idea of a 'panorama of the index' formed of virtual shadows cast from digital to physical space. These extended digital affordances are core to the extended context of the print, which remains 'live' and even editable throughout the digital persistence of the work and its matrix. This is a decisive marker of transition from analogue/digital (traditional) printmaking to Printmaking2.0.
- The blurring of on-line and off-line living, social networking and affinity spaces are promoting new forms of collaboration and participation which this research examined. This is a marker of the transition from a local analogue community towards an international digital neighbourhood in printmaking practice and is evidenced by the creation and promotion of new affinity groups among the printmaking community.
- Printmaking2.0 is practised in 'the digital medium' whereas traditional printmaking uses what are commonly viewed as 'digital tools' when creating works though traditional media. The product of digital printmaking (electromechanical matrix) is part of physical space, whereas the product of Printmaking2.0 (digital matrix) occupies digital space which illustrates this.
- The development of the print matrix is essentially linear and fixed in traditional printmaking. The digital processes in Printmaking2.0 are,

by nature of the medium, reversible through the language of digital code and the new common digital language into which 'undo', 'history' and 're-coding' fall. Printmaking2.0 works remain fluid in the digital construct of the post-physical matrix and have the potential of being updated and re-worked. The prints instantiation (the post-physical equivalent of impression) and its duration in 'the present' are directly controlled by the engaged audience or percipient. This is a relativistic temporal model, in which the post-physical print remains unfixed and capable of 'instancings' beyond the hand and even the lifespan of the original artist.

- This domain is no longer concerned with physical object production but understands the post-physical practices intrinsic in fluid 'counter-permanence'. The model employs a visual language of multiple, simultaneous and temporal virtual 'windows', rather than the fixed and singular forms of traditional practice. It is a language evolving from the hyper-mediated demands of contemporary digital audiences.

6.2 Printmaking2.0 and other contributions to knowledge

6.2.1 *Printmaking2.0*

This research provides a significant contribution to printmaking through contextualised practice based research. In which the researcher has conceived, developed and refined new practice models for the emergent domain of Printmaking2.0 (digital matrix). Models are founded expressly in post-physical practice in a post-studio context, embracing the 'lingua franca' of contemporary digital practice in the production of 'born digital', virtually imprinted forms. They provide 'proof of concept' for the development and exploration of immersive surfaces in printmaking through augmented print and the digital impression of virtual matrices on physical space. Through public exposition and academic discourse the models are presented to public, professional and academic communities, they can now form the basis for further refinement and development by practitioners of this emergent domain of artistic printmaking practice.

6.2.2 Taxonomy of contemporary printmaking practice

The research presents an extended 'Taxonomy of contemporary printmaking practice' (see Figure 95 p.222) developed through critical review and tested against contextualised practice. The taxonomy classifies four domains for contemporary printmaking founded on their matrices: 1) traditional printmaking - direct matrix, 2) traditional printmaking - transferred matrix, 3) digital printmaking - electromechanical matrix and 4) Printmaking2.0 - digital matrix. These provide the wider community with a new tool for classifying contemporary print, illustrating the markers of transition between the domains, while highlighting the familial relationships of analogue and digital print making practices. It is hoped that this taxonomy will provide clearer understanding amongst the printmaking community of its own evolutionary nature.

6.2.3. Social media as a research tool

An 'engaged' model for using social media as a research tool in an artistic community is presented to the wider community through peer-reviewed publication. The mechanisms of digital participation were central to this research and also became the mechanisms of the study itself - 'networks as a research tool'. The social networking mechanisms identified and adopted became means of data collection and research output, or 'conversations in digital space'. Social media based facilitation was an enabling process used as a specifically designed proactive research tool. It enabled a dynamic triangulation between contextual review, direct consultation and collaborative curatorial activity.

6.2.4 Adoption, development and application of 'probe' methodology

Practice-based 'probe' methodology is promoted as a model for visual art research. Novel subject specific 'probes' are developed and examine new approaches to digital printmaking practice. They are specifically designed research tools for research through practice, conceptually descendant from William Gaver's 'cultural probes' (Gaver et al., 1999' 21-29).

Custom 'probes' were developed to examine questions generated from critical review against stated research objectives. The 'probe' model uses

the researcher's critically engaged practice to explore areas of practice through projects. Although undertaken as creative responses, they are primarily intended as critical investigations. The probes then map directly back into the research elements from which they were generated. The model developed, tested and applied through this research has contributed a robust variant to the model, which is applicable in further and broader visual art practice research contexts.

6.2.5 Public exposition and peer reviewed publication

Significant contributions to international artistic and academic communities have been made through public exposition peer reviewed publication and international conference participation.

Research Probe 1 'born digital – new materialities' digital print exchange has been digitally conserved and published through Robert Gordon University's 'OpenAIR@RGU'⁷¹ repository as a curated portfolio of the work of 49 digital print artists from 10 countries, as a means of enabling institutionally based public access to the collected works. In addition an expanded paper was published digitally via www.researchcatalogue.net⁷², providing detailed critical and contextual analysis of the portfolio.

The critically contextualised artistic results of the research were presented to audiences and the broader academic community through a public exposition 'probes', curated and presented in the Exhibition Space of the Georgina Scott Sutherland Library of Robert Gordon University 26th October 2012 to 18th January 2013.

The research has contributed to 3 international conferences: Impact 6 International Printmaking Conference, Bristol 2009, the 3rd Annual International Conference on Visual and Performing Arts, Athens 2012 and Impact 8 International Printmaking Conference, Dundee 2013. These

71 Available at: <https://openair.rgu.ac.uk/handle/10059/776>

72 Available at <http://www.researchcatalogue.net/view/31555/31556/33>

resulted in the subsequent publication of peer-reviewed papers. The researcher has contributed material from this research to the public lecture programmes of the University of Stirling, the Edinburgh Printmakers Workshop and undergraduate teaching programmes at the Department of Creative Industries, Forth Valley College, Scotland.

Although intended primarily for practioners and students in the printmaking community, the findings in this thesis may also contribute to an understanding of digital culture in the broader community; with reference to the post-physical condition⁷³, augmented reality⁷⁴ and redefinitions of authenticity⁷⁵. It is hoped that by making the data sets available from this research in the digital appendices, other researchers will be able to develop and use this material further.

6.3 Concluding remarks and areas for further research

This research was developed to answer questions raised through the professional activities of the researcher in contemporary printmaking. It has established a taxonomy for contemporary printmaking practice which maps its physical and temporal boundaries. The research has explored these boundaries and developed and tested post-studio models that have explored the conception, production, editioning, collection and ownership of 'print' in an increasingly networked digital age. It has theorised the philosophical concepts surrounding digitally mediated post-physical printmaking's new conditions: the singularity of digital evolution and the artistic potential of a shift in our aesthetic from permanent objects in space to temporal experiences.

New models for the practice of Printmaking2.0 have been developed in the technical practice of post-physical printmaking and the artistic implications

73 See sections 5.1 Materiality, 6.1.2 Digital participation and 6.1.3 Markers of transition

74 See sections 2.3.4 Summary of section: materiality and signature in post-studio practice, 2.6.3 Materiality and permanence, 5.1 Materiality and 5.5 The digital print art object: Defining Printmaking 2.0

74 See sections 2.6.5 Authenticity, 5.1 Materiality, 5.5 The digital print art object: defining Printmaking2.0 and 6.1.1 *The new boundaries of the print artefact*

of cultural shifts, following mass digital participation and post-physical embodiment. Overall the researcher envisions the potential of post-physical practice on the boundaries of embodiment between physical and digital space with enthusiasm. The following areas were identified for further research:

1. Further develop and apply research probe methodology in practice led visual art research.
2. Undertake practice led research explorations of digital culture and communities, through post-physical socially mediated collaborative printmaking practice.
3. Promote post-studio and post-physical practices in the broader creative communities.
4. Exploration of digitally augmented printmaking in the light of emergent technologies such as wearable (Google Glass for example) and gestural technologies.
5. Further develop through practice based research conceptions of the temporal print form exploring the implications of 'flow' and 'montage' in the fluid matrix

These are contextualised in the philosophical debate surrounding the ubiquitous adoption of digital technologies and the implications for society and culture.

7.0 Glossary/definition of terms

Augmented reality: "Any case in which an otherwise real environment is "augmented" by means of virtual (computer graphic) objects" (Milgram and Kishino, 1994').

'Aura': Is defined in The Dictionary of Critical Theory as:-

"An important, but very ambiguous, term used by Walter Benjamin in his account of the work of art in the period of Modernity (1935, 1936). It refers primarily to that quality of a painting or sculpture seen in the immediacy of 'its here and now' (sein Hier und Jetzt), or its 'unique existence at the place where it happens to be' (Benjamin 1936). In his famous description of the work of art in the age of mechanical reproduction, meaning lithography and then photography, Benjamin remarks that not even the most perfect reproduction can capture this fleeting 'Aura'." (Macey, 2001')

'Aura' remains a critical concept in the theorisation of mediated art forms including printmaking and is often used and abused in the much-debated relationship between the fine and reproductive arts. The researcher argues that in the context of augmented and virtual reality based second-generation printmaking (Printmaking2.0) Benjamin's concept of the work of art's 'unique existence at the place where it happens to be' (Benjamin 1936) is re-established through each unique instantiation of the virtual print object.

Authorisation: The mechanism used for the print artist's sanction over an edition.

Since the Renaissance the traditional western mechanism for authorisation or sanction of artwork has been through signature. This evolved historically as having particular significance in the practice of printmaking because of the division of labour between the artist, the engraver, the printer and the publisher (Daniels, 1996'). The traditional link between signature and the authorisation of the artist come into question, given the questions raised by digital processes and its facility for repetition and duplication. Where digital

is part of a process of mediation which results in instantiation through traditional means then accepted norms of signature and editioning will continue to suffice in printmaking practice. It is as digital and de-materialised mechanisms allow the printmaker to expand their methods of instantiation beyond ink on paper then new paradigms may be required. Metadata may be significant in the development of digital signature.

Born-digital:

"When an object is created in digital form, we describe it as being "born digital." Everyday examples of born digital materials include web sites, e-mails, and digital photographs. Often, these born digital materials have no physical counterpart." (The-Library-of-Congress, 2010')

In "Defining 'Born Digital'" (Erway, 2010'), 'born digital' is defined as "... items created and managed in digital form" (Ibid) and he identifies these resources may be typified as "digital photographs, documents, harvested web content, digital manuscripts, electronic records, static data sets, dynamic data, digital art and digital media publications" (Ibid).

"Citizen practitioner": (Schön, 1983') references Halmos, P.(1973) to describe the "citizen practitioner" - a creation of a new breed of citizen-practitioners—citizen-planners, citizen-builders, citizen-physicians, who will be equipped to take over the territories of the professional experts.

Cloud – 'The Cloud'

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released, with minimal management effort or service provider interaction." (N.I.S.T. et al., 2009')

"Cloud computing refers to applications and services offered over the internet. These services are offered from data centres all over the world, which collectively are referred to as the "cloud." This metaphor represents the intangible, yet universal nature of the internet

Examples of cloud computing include online backup services, social networking services and personal data services such as Apple's iCloud. Cloud computing also includes online applications, such as those offered through Microsoft online services. Hardware services, such as redundant servers, mirrored websites and internet-based clusters are also examples of cloud computing." (Techterms.com, 2010')

Collaboration: the sharing of working processes in the conception and or production of art objects.

Collaboration is a shared working process that occurs between people (Skopa, 2003'). This generalist view may be further refined in printmaking practice where collaboration has traditionally focussed on the relationship between artist, printmaker and publisher (Ashe, 2001'). These collaborations focus on production and publication of the artefact (print or otherwise) and, as such, continue into the digital medium. Another notion of collaboration between artists is "of a group of artists working together, pooling their ideas, communicating to one another their discoveries and achievements" (Read et al., 1949'). Originally conceived in connection with the working practices of S.W. Hayter's Atelier 17, this concept is equally applicable to the internet based digital networks operating in contemporary art practice; where artistic collaboration over time and distance is engendered through post-physical practice. Hence, in the context of this research, collaboration is defined as: the sharing of working processes in the conception and or production of art objects.

Contextual review: review of the research context through a multi method approach, including documentary and non-documentary sources.

Curation: the act or process of facilitating audience engagement with art practice, process or product. In this research curation is used as a tool to gather or generate data within this context.

Digital: the term digital has evolved a broad series of definitions in various contexts, however this research adopts the following definition derived from the Oxford Dictionaries "the use of computer technology"(Oxford-

University-Press, 2013') for the "use, or storing data or information in the form of digital signals" (Ibid) founded on the expression "of the digits 0 and 1, typically represented by values of a physical quantity such as voltage or magnetic polarization. And often "contrasted with analogue"(Ibid).

Digital culture: "... digital culture can be seen as an emerging set of values, practices and expectations regarding the way people (should) act and interact within the contemporary network society. This digital culture has emergent properties with roots in both online and offline phenomena, with links to trends and developments predating the World Wide Web, yet having an immediate impact and particularly changing the ways in which we use and give meaning to living in an increasingly interconnected, always on(line) environment." (Deuze, 2006' 63-75)

Digital matrix: The digital state from which an image can be instanced with original intent.

The traditional term Matrix is by definition the physical surface from which an image is printed, woodblock, plate, stone or screen (Wye, 2004'). Although these may in themselves be produced digitally they comprise a traditional (physical) matrix. A digital matrix however is a repository of material which, stored digitally, is combined by the artist's hand and instanced with original intent; Philip George's "fluid diary" providing an early example (George, 2002' 121-127). Technically the digital matrix comprises stable digital storage mechanisms (which retain the data when switched off) rather than volatile random access memory. Conceptually online and remote storage (including the internet) may form the digital matrix as a whole or in part, as there is no need for this storage to be in the physical presence of the artist.

Digital print(making): "A general term for any print that incorporates digital technology in the creation of an image or its printing". (Wye, 2004') Consequently 'digital printmaking' can encompass both material and post-physical manifestations of the fine art print in a digital matrix.

In the context of this research the terms traditional printmaking and printmaking 2.0 are used. These terms do not merely reflect a simplistic

model, which might view traditional printmaking as pre-digital and new printmaking as post-digital. The differentiation is greater than these, reflecting post-modern approaches to fine art (printmaking) practice. Traditional printmaking may be viewed as strictly embedded in the pursuit of print production through singular process for example relief*, intaglio or lithography. Printmaking 2.0 reflects contemporary trends for mixed method and mixed media techniques in the inception and production of diverse forms of art making, reflecting the dissolution of traditional categories through hybrid art forms (Atkins, 1990') which transcend traditional modes of practice (Jones, 2005')

Epistemology: What is the nature of the relationship between the knower (inquirer) and the known (or knowable)? (Guba, 1990')

Facilitation: derived from the transitive verb – facilitate: to make easy or easier (Chambers, 2008'). In the context of this research, facilitation is an enabling process employed as a proactive research tool.

Fold(ing): Deleuze's concept of the "fold" (1993) and his subsequent explorations of the concept have seen adoption in contemporary digitally mediated technological creative practices such as architecture. From reading Deleuze and its subsequent architectural contexts this research defines folding as: "A flow from outside to inside, across different scales and independent of distance, where neither is fixed but rather in constant exchange." (Krissel, 2004') A multiplicity capable of folding and refolding within itself in which: "the unit of matter, the smallest element of the labyrinth, is the fold; not the point which is never a part, but a simple extremity of the line." (Deleuze, 2006')

Generation Y: "the generation born in the 1980s and 1990s, comprising primarily the children of the baby boomers and typically perceived as increasingly familiar with digital and electronic technology" (Oxford-University-Press, 2013')

Hypermediacy: "A style of visual representation whose goal is to remind the viewer of the medium; one of the two strategies of remediation, the other is (transparent) immediacy" (Bolter and Grusin, 2000').

Instance/instantiation: the manifestation of a digital construct to sentience.

Drucker states that "it is the manifestation into substance, the instantiation of form into matter that allows something, anything, to be available to sentience" (Drucker, 2001' 141-145). Although instantiation or instance of the art object may be analogue or digital the concept assumes particular significance in the context of the digitally transferred image, but simply at the most basic level. "No two pixels are alike and that the instantiation always bears in its material embodiment the specificity that makes for difference from the (digital) code" (Drucker, 2001' 141-145). In this research the instance or instantiation is defined as: the manifestation of a digital construct to sentience.

Intaglio – "A general term for metal plate printing techniques, including etching, drypoint, engraving, aquatint and mezzotint. In intaglio printing the lines or areas that hold the ink are incised below the surface of the plate and printing relies on the pressure of a press to force damp paper into these incised lines or areas, to pick up ink. Intaglio comes from the Italian word "intagliare" meaning "to incise."" (Wye, 2004')

Immediacy (or transparent immediacy): A style of visual representation, whose goal is to make the viewer forget the presence of the medium (canvas, photographic film, cinema and so on) and believe that he is in the presence of the objects of representation. One of the two strategies of remediation; the other is hypermediacy. (Bolter and Grusin, 2000')

Iconic/Iconic sign See under "**Sign**"

Indexical/Indexical sign See under "**Sign**"

Lithography: "The term is derived from the Greek words for stone (litho) and drawing (graph), since the technique involves drawing with greasy

crayons or a liquid called tusche, on a polished slab of limestone. Aluminium plates which are less cumbersome to handle, may also be used. When the image is ready to be printed the surface is dampened with water, which adheres only to the blank, non greasy areas. Oily printer's ink, applied with a roller, sticks to the greasy imagery and not to areas protected by the film of water. Paper is placed on top of this surface and run through a press to transfer the image." (Wye, 2004')

Materiality: The sensory perception of art object or process

Traditional views of art prescribe a relationship between medium, materiality and genre which, with the advent of postmodernism has become increasingly eroded (Buskirk, 2003'). Initial primary research (Thompson, 2009b') reveals a range of views held by contemporary printmaking practitioners as to the definition of materiality within their practice.

- "A work must exist in physical form not just pixels"
- "The materiality of traditionally made prints - the textures, embossing, marks, plate tone, even the smell."
- "The materiality (of digital prints) is flat, which I find lifeless and I dislike."
- "... a woodblock or a metal plate is just easier to believe in because, as a matrix, it is material. Though the matrix in the form of a digital file is not material, it has more potential for long life as it will not biodegrade and it does not take up shelf space. The digital information is stable so long as it's not discarded. But when the technology is no longer useful, it will become difficult to find a way to view it. Watched any beta max videos lately?"

Concepts of the 'material' are significant and as such are associated with sensory perception of the art object/process. The term 'materiality' in the context of this research is defined as: - The sensory perception of art object or process.

Meta Layer: used in the context of traditional printmaking, a layer may be viewed as a function of the separation process where layers of the print

(visual information) are built physically upon preceding layers to form an image. In digitally mediated printmaking the researcher proposes that "meta layers" applied to the dematerialised print art object are the substance of the construct, providing meta information including technical, artistic, authorial and other information. Such activity is, in an early form, apparent through "tagging" and "geo-tagging".

Methodology: Guba defines 'Methodology' as: "how should the inquirer go about finding out knowledge" (Guba, 1990'). Gray and Malins identify "the terms 'methodology' and 'method' are often abused and sometimes used inter-changeably, but there is a distinct difference." (Gray and Malins, 2004') Methodology is the knowledge and understanding of the specific methods employed in the research, whilst (in the case of artistic enquiry) Methods are the

"... specific techniques and tools for exploring, gathering and analysing information, for example observation, drawing, concept mapping, photography, video, audio, case study, visual diary, models, interviews, surveys, and so on." (Ibid)

For this research we may add, for example: research probes, surveys, interviews and print exchange to the methods cited by Gray and Malins.

Modular creativity: is founded in Lev Manovich's concepts of post 20th century cultural modularity wherein "... any well defined part of any finished cultural object can automatically become a building block for new objects in the same medium" (Manovich, 2005b'). Manovich defines "the standard twentieth century notion of cultural modularity involved artists, designers or architects making finished works from the small vocabulary of elemental shapes, or other modules" (Ibid).

Online Network(s)(ing): generally defined as an affinity grouping which, in the context of this research, refers specifically to those online affinity "spaces" (Davies, 2006' 217 - 234) populated by the international print art community.

Objectile: A Deleuzian concept where “the object assumes a place in a continuum by variation” (Deleuze, 2006') and “... the object no longer refers its condition to a spatial mould; in other words, to a relation of form-matter - but to a temporal modulation ...” (Deleuze, 2006, p.20).

Ontology: at its simplest level Guba identifies that ontology is about what the nature of the “knowable is. Or, what is the nature of “reality”? (Guba, 1990'). However the Stanford Encyclopaedia of Philosophy suggests:

“The larger discipline of ontology can thus be seen as having four parts:

- (O1) the study of ontological commitment, i.e. what we or others are committed to,
- (O2) the study of what there is,
- (O3) the study of the most general features of what there is and how the things there are related to each other in the metaphysically most general ways,
- (O4) the study of meta-ontology, i.e. saying what task it is that the discipline of ontology should aim to accomplish, if any, how the questions it aims to answer should be understood, and with what methodology they can be answered.”
(Hofweber, 2013')

Given the practice led focus of this research, O1-O3 apply with the ontological commitment being Constructivist in nature.

Palimpsest - Traditionally conceived as a “manuscript in which old writing has been rubbed out to make room for new, a monumental brass turned over for a new inscription Etymology: Gr palimpsēston, from palin again, and psāein (contracted psēn) to rub.” (Chambers) Kathryn Reeves envisioned the “infinite palimpsest” in the context of “printmaking, as an infinite palimpsest, ... a material and conceptual surface that stretches across vast spatial and temporal distances” (Reeves, 2001'). This research has adopted conceptions of a digital palimpsest in the boundaries between digital and physical space.

Permanence: - The quotient of the art object's physical permanence set against its potential for variable but repeatable instancing.

The concept of permanence in fine art is closely aligned with both fiscal values and the practicalities of conservation. In fine art generally there are many means, methods and materials used in the production of art. As a

result achieving longevity, stability and permanence of the art object is complex and the work of the conservator is specialised and expert.

In printmaking there is a predisposition towards making works on paper which "can be damaged by light, extreme or fluctuating temperature and relative humidity, pollution, pests, and poor handling, storage and mounting" (The-Conservation-Register, 2006'). Practical application of 'archival quality' in the selection and use of the materials and processes in the printmakers practice has become significant. Traditional processes have evolved over time and the means of their conservation has developed. It is logical that there will be an inevitable delay in the development of new means of conservation with the development of new materials, mechanisms and methods. It is just this scenario, current in digital printmaking, that is challenging the established and accepted mechanisms of archival when set against digitally mediated works of variable nature. Recent research has examined the relationship between digital print, inks and paper against the context of the fine art printmaker rather than the commercial printer (Hoskins, 2001'). This research, combined with on-going American research (Wilhelm and Wilhelm, 2002 - onward'), is establishing known parameters for the production of archival digital prints on paper. Arguably the digital print however goes further than printing on paper. In the context of digital printmaking lies the opportunity to manifest works of art through the transfer of artistic expressions, from a constructed matrix to a secondary surface or surfaces that are not traditionally based (Projected, LCD, Plasma, Thin Film rather than Paper, Fabric or Wood) by means which are also not traditional.

Consequently the term permanence within the context of this research is defined as: the quotient of the art object's physical permanence, set against its potential for variable but repeatable instancing.

Practice: A dictionary definition of the term 'Practice' identifies this as a professional person's business, as a field of activity or a property (Chambers, 2008'). In the context of this study the term is used in the

context of 'artistic practice', which defines an artist's approach to making art, its scope, methods and philosophy.

Physical Practice: the exercise of art process through physical means, methods and materials derived from traditional concepts of the exercise of art process through physical means, methods and materials in the production of the work of art.

Post-physical: where physical locality is no longer prerequisite and/or in a once physical cultural artefact is no longer dependent on the transference of a physical form.

Post-physical practice: Where physical locality is no longer prerequisite. The post-physical condition is arrived at when the art object "presented through an online or digital medium, shifts from the physical to the temporal" (Corcoran, M, 1996). These post-physical forms demand new approaches and new aesthetics which require an "intellectual shift away from simple object production" (Hovagimyan, 2001' 453-458), and recognition of the intellectual processes inherent in a practice of fluid permanence and reversible process. Working within this domain constitutes the practice of second generation, post-physical printmaking or 'printmaking 2.0' for:

"... the 'post-cinematic' 'post-televisual' viewer (who) has new forms of ever-virtual mobility, new speeds of access to deep histories of images and text, newly mobilized screens that travel in airplanes and automobiles, screens that can be hand-held and wireless" (Friedberg, 2009').

Post-studio: in which the physical studio environment and associated equipment is supplanted by a software environment.

Print: an original work of art manifested through the transfer of an artistic expression from a constructed matrix to a secondary surface or surfaces.

The term print varies in definition according to the context of its use. In this research it is placed in the context of fine art practice. Put at its simplest, a print may be defined as: "an impression made by any method, involving transfer from one surface to another." (Tate-Britain, 2008') Literature review supported by primary research (Thompson, 2009b') reveals that in contemporary fine art such definitions are further adapted and reconstructed by practitioners through theorisation of their own practice. The Digital Art Practices and Terminology Task Force (DAPTTF) defines 'print' as:

"1. In the context of fine art, an original work of art (as a woodcut, lithograph, photograph, or digital print) where the art object or artwork does not exist until it is printed. The print is made directly from the matrix by the artist or pursuant to his/her directions; also known as "fine print," "work on paper," and "original print." 2. A physical image, usually on paper, produced by, but not limited to, such processes as etching, lithography, serigraphy, relief printing, photography or digital methods. Prints are usually, but not always, produced on paper and in multiples. Traditional, photographic and digital processes can be used to produce prints." (Kevin, 2008')

To which may be added more specialist and, perhaps, limited processes such as pochoir, monoprint and photo transfers. "The principal has however been established that within contemporary fine art printmaking the increase of mixed media techniques and process is rendering definition increasingly irrelevant " (Pengelly, 1997'). Founded on the principal that the primary commercial printmaking processes, once developed, are adopted by the artist; then digital print must be added to the core list of: relief, intaglio, lithography and serigraphy.

Printmaking: the act or process(es) of making an original work of art manifest, through the transfer of an artistic expression from a constructed matrix to a secondary surface or surfaces.

The UK based Cr3i consortium's online publication Art and Design Index to Thesis defines printmaking as:

"Printmaking, the study of/training in the expression of emotions, ideas or views of reality by rendering art concepts onto surfaces and transferring images, via ink or dyes, onto paper or fabric." (ADIT, 2008')

Printmaking2.0: is the notion of second-generation printmaking posited by this research. Printmaking2.0 is the post-studio, post-physical practice of printmaking in digital and digital/physical hybrid space through the use of digital processes, ubiquitous computer networking and 'smart' portable personal devices including phones and tablets.

Probe: Conceptually probes are derived from the "cultural probe" model developed by William Gaver, which were "collections of evocative tasks meant to elicit inspirational responses from people ... fragmentary clues about their lives and thoughts" (Gaver et al., 1999' 21-29) and, in the context of this research, constitute specifically designed practice based research tools.

Push/Pull Media: Concepts of 'push' and 'pull' are widespread in media and marketing discourse. Naughton illustrates the concepts as:

"Broadcast TV is a 'push' medium. A relatively select band of producers (broadcasters) decide what content is to be created, create it and then push it down analogue or digital channels at audiences, which are assumed to consist of essentially passive recipients The Web is the opposite of broadcast: it's a pull medium. You choose stuff and click on it to pull it down onto your computer. You're in charge." (Naughton, 2012b')

Relief "A general term for those printmaking techniques in which the printing surface is cut away so that the image alone appears raised on the surface. Relief prints include woodcut, linoleum cut, letterpress and rubber or metal stamping. The raised areas of the printing surface are inked and printed, while the areas that have been cut away do not pick up the ink. Metal plates with incised lines can also be printed in relief when the surface is inked and the incised lines are not." (Wye, 2004')

Remix(ability): as defined by (Dybwad, 2005') "is a transformative process in which information and media" which has been "organized and shared can be recombined and built on to create new forms, concepts, ideas, mashups and services".

Remediation/Remediative: "Defined by Paul Levenson as the "anthropotropic" process by which new media technologies improve upon or remedy prior technologies. We (Bolter and Grusin) define the term differently, using it to mean the formal logic by which new media refashion prior media forms. Along with immediacy and hypermediacy, remediation is one of the three traits of our genealogy of new media." (Bolter and Grusin, 2000')

Replicable/transmissible art: Barfield, Barfield & Whale propose in their joint paper Defying Convention: Emergent Practices in Digital Print, IMPACT II Helsinki (2001), that the practice of "printmaking itself may be subsumed into a larger and more diverse world of replicable, transmissible, mediated art and communication" (Barfield et al., 2001'), which this research now codifies as 'Replicable/transmissible art'

Serigraphy (screenprint): "A technique in which the first step is to stretch and attach a woven fabric screen (originally made of silk, but now more commonly of synthetic material) tightly over a wooden frame. Areas of the screen that are not part of the image are blocked out with a variety of stencil-based methods. A squeegee is then used to press ink through the unblocked areas of the screen, directly onto paper. Also known as silkscreen." (Wye, 2004')

Sign "A semiotic term that describes the relationship between a vehicle of meaning, such as a word, image, or object, and its specific meaning in a particular context. In technical terms, this means the bringing together of signifier (word/image/object) and signified (mental concept of the referent) to make a sign (meaning). It is important in semiotics to note that signifiers have different meanings in different contexts. For example, in a classical

Hollywood film, a cigarette might signify friendship or romance, but in an anti-smoking ad it would signify disease and death.” (Sturken and Cartwright, 2009'). Charles Peirce distinguished iconic, indexical and symbolic signs. See Indexical sign, Semiotics, Symbolic sign. (Sturken and Cartwright, 2009')

Iconic/iconic sign "Used by Charles Peirce to indicate those signs in which there is a resemblance between the signifier (word/image) and the thing signified. For example, a drawing of a person is an iconic sign because it resembles him or her." (Ibid)

Indexical/indexical sign Peirce uses this term to indicate those signs with a physical, causal connection between the signifier (word/image) and the thing signified, because both existed at some point within the same physical space. For example, smoke coming from a building is an index of a fire. Similarly, a photograph is an index of its subject because it was taken in its presence. Peirce distinguished iconic, indexical, and symbolic signs". See iconic sign, semiotics, symbolic sign. (Sturken and Cartwright, 2009') However, Notes on the Index Parts 1 and 2 (Krauss, 1977' 68-81, Krauss, 1977' 58-67), identifies that "... it must be understood that there is a decisive break between earlier attitudes towards the index and those at present" (Krauss, 1977' 58-67). Krauss argues that the index in contemporary practice goes beyond any strict ideas of photographic index/reality "physical manifestation of a cause, of which traces, imprints, and clues are examples." (Krauss, 1977' 58-67).

Symbolic sign A term Peirce uses to indicate: "those signs in which there is no connection between the signifier (word/image) and the thing signified, except that imposed by convention. Language systems are primarily symbolic systems. Peirce distinguished iconic, indexical and symbolic signs. For example, the word university does not physically resemble any actual university (in other words, it is not iconic), nor does it have a physical connection to the university (so it is not indexical), hence it is a symbolic sign ..." (Sturken and Cartwright, 2009')

Simulacra (plural form of simulacrum) "In Latin this word denoted a material representation or image, usually of a deity. The term has been given a new importance by Baudrillard's account of postmodernity" (Macey, 2001'). Baudrillard posited three orders of simulacra: the first order originated as representations of basic reality became subsumed as hierarchical symbols, the second order as products of mass production conform to Benjamin's conceptions and consequent loss of 'Aura', finally the third order are imitations of imitations bearing no resemblance to any basic original. As Macey also suggests, "the early work of the American artist Cindy Sherman (1954-) represents an exemplary exploration of the simulacrum" (Ibid). Baudrillard himself held Disneyland to be the ultimate simulacrum.

Symbolic sign See under "**Sign**"

Temporal/temporality: the condition of time in the art object represented as temporal duration. Based on the premise that engagement with the art object shifts from the physical to the temporal, when digitised and presented through an online or medium, (Corcoran, 1996' 375-378). This use is set within the context of time (Chambers, 2008'), it may be further hypothesised that instantiation of the digitally mediated art object by means in addition to the internet (for example Bluetooth, cellular telephony, digital broadcast) is also temporal in terms of delivery, permanence and materiality. For the purpose of this study, temporality is defined as the condition of time in the art object represented as temporal duration.

Topoi: The topological approach to artistic research is defined by the Norwegian academic Aslaug Nyrnes as "... to know a landscape. To know a landscape is to know the topology of knowledge" (Nyrnes, 2004'). Topology is derived from "the original Greek phrase ... 'topos', pl. 'topoi' (and in Latin 'locus', pl. 'loci'), and it means 'place', 'spot', or rather, 'geometrical spot'. It is the same word as in 'topography', geographical spots. Topology means spots or places in the language, places you pass frequently." (Ibid) In the "topological" approach to artistic research there are "three main places, sites, or topoi in a research project ..." (Nyrnes, 2006') And "It is possible

to distinguish between three main topoi (or sites): the language of the researcher, that of the theory, and that of the material/the research object/the artistic field." (Ibid)

Web2.0:- "...new tools that explore the continuum between the personal and the social and tools that are endowed with a certain flexibility and modularity, enabling collaborative remixability. This is a transformative process, in which the information and media we've organized and shared can be recombined and built on to create new forms, concepts, ideas, mashups and services." (Dybwad, 2005')

8.0 Image credits

Figure 14: Screen shot from Justseeds website. Image reproduced by kind permission of Meredith Stern and Justseeds.org

Figure 16: digital (multi-pen) plotter drawing "Cyberflower, Sunshine1" (Verostko, 2008). Image reproduced by kind permission of the Artist and V&A Collections © Victoria and Albert Museum, London/ Roman Verostko

Figure 17: Digital Diagrams for "Serpents and Snails", 2000, FormZ digital image (Gernand, 2005). Image reproduced by kind permission of Bruce Gernand

Figure 18: Installation view of "Serpents and Snails", 2001, Ceramic, made at European Ceramics Work Centre (EKWC), Holland. Image reproduced by kind permission of Bruce Gernand

Figure 19: Still from "Biogenesis" (Latham, 1993). Image reproduced by kind permission of William Latham (<http://www.latham-mutator.com/>).

Figure 20: Digital print "The Marriage" (Hamilton, 1998). Image reproduced Courtesy Alan Cristea Gallery and the Richard Hamilton Estate.

Figure 21: Glasswork "Flight Landing" (Mann, 2005). Image reproduced by kind permission of Geoffrey Mann.

Figure 22: "Between the two" 2 x double sided hand cut inkjet print, steel pins 103cm x 10m x 1mm (Guy-Robinson, 2009). Image reproduced by kind permission of Graham Robinson.

Figure 23 3D Print "Manta Ray" (Reid, 2010). Image reproduced by kind permission of Brendan Reid.

Figure 25: P-197 1977-1979 (Screenprint from digital) (Mohr, 1977-79). Image reproduced by kind permission of by kind permission V&A Collections © Victoria and Albert Museum, London.

Figure 26: Shotter (lithograph from a computer-generated drawing) (Nees, 1968-1970' Lithograph in black ink from a computer-generated graphic) Image reproduced by kind permission V&A Collections © Victoria and Albert Museum, London

Figure 27: Frieder Nake, *Homage à Paul Klee 13/9/65 Nr.2* (Screenprint on paper from plotter drawing) (Nake, 1965). Image reproduced by kind permission V&A Collections © Victoria and Albert Museum, London

Figure 29: *Poeira de São Paulo*, (2009) by Debora Ando. Image reproduced by kind permission of the artist.

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Figure 45: *"Frenzy"*, Janssen T. (2011), USA. Image reproduced by kind permission of the Artist.

Figure 46: *"Projected View"*, Clark A, (2011), UK. Image reproduced by kind permission of the Artist.

Figure 47: *"Democracy Corrupted"*, McMaster R. (2011), Australia. Image reproduced by kind permission of the artist.

Figure 48: *"Permutation"*, Cornell D. (2011), USA. Image reproduced by kind permission of the artist.

Figure 49: *"OrnamenNov1"*, Nicol C. (2011), USA. Image reproduced by kind permission of the artist.

Figure 50: *"Little Lover"*, Low K. (2011), UK. Image reproduced by kind permission of the artist.

Figure 51: *"I have a Headache"*, Wicka L. (2011), USA. Image reproduced by kind permission of the artist.

Figure 52: *"Bridge of glass, sea of fire"*, Bang A.E. (2011), Norway. Image reproduced by kind permission of the artist.

Figure 56: "Greenman - Spring", Gallagher K. and Stark G, (2011), UK. Image reproduced by kind permission of the artists.

Figure 73: Augmented Reality Workshop during DART seminar. Image reproduced by kind permission of Robert Gordon University.

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Figure 95: Map of printmaking atelier types and domain matrices images reproduced by kind permission of:

- 1 Collagraph "Limekilns" (Thompson P, 2009)
- 2 Woodcut "The White Mare Pool" (Thompson P, 2006)
- 3 Wood Engraving Olympic Stadium with Cranes II (Desmet A, 2009)
- 4 Etching "Poeira de São Paulo" (Ando D, 2009)
- 5 Plate Lithograph " Dot-screen Suzuki" (Thompson P, 2007)
- 6 Silkscreen "Framing Nature - Trees", (Coldwell P, 2008)
- 7 Digital Print "The Marriage" (Hamilton R, 1998)
- 8 3D Print "Manta Ray" (Reid B, 2010)
- 9 Projection " Projected View" (Clark A, 2011), UK
- 10 Augmented Print "Four Walks @ 55 Degrees North" (Thompson P, 2012)
- 11 Virtual Reality Print "Linea Australis" (Cornell D, Accessed 2013)

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An examination of the physical & temporal parameters of post-physical printmaking practice: exploring new modes of collaboration, distribution and consumption resulting from digital processes & networked participation.

Appendices

Paul Thompson

February 2014

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APPENDIX I Qualitative Research Pilot Studies

Pilot 1 – Survey

Using an online survey service (www.surveymonkey.com) a pilot survey was undertaken amongst printmaking practitioners. The pilot evidenced that the mechanism to be stable and generated sufficient data for meaningful analysis. The question structure was designed to be open to elicit qualitative rather than quantitative results.

Printmaking Research – Pilot Survey #1 Response Summary

1. In your own words could you please tell me what you think the term "Print" means -

Answered question	45
Skipped question	0
Response Count	45

2. Please describe what you believe the art-practice or process of "Printmaking" to be -

Answered question	45
Skipped question	0
Response Count	45

3. In relation to "printmaking" could you please describe what you think the term "Traditional Print" means

Answered question	45
Skipped question	0
Response Count	45

4. In relation to "printmaking" could you please describe what you think the term "Digital Print" means-

Answered question	44
Skipped question	1
Response Count	44

5. Please describe how you use digital technology and computers in your practice / printmaking - for example how do you use it in process, promotion, exhibition, communication etc.

Answered question	44
Skipped question	1
Response Count	44

6. Could you please tell me how you think the terms "permanence" and "materiality" might apply to:-

Answered question		40
Skipped question		5
	Response Percent	ResponseCount
Traditional printmaking	100.0%	40
Digital printmaking	95.0%	38

7. Could you please tell me how you think the terms "authenticity", "authorisation" and "allocation" might apply to:-

Answered question	40	
Skipped question	5	
	Response Percent	ResponseCount

Traditional printmaking	97.5%	39
Digital printmaking	95.0%	38
8. Could you please tell me what the term "collaboration" in printmaking practice means to you.		
Answered question		42
Skipped question		3
Response Count		42

Figure 1: Pilot Survey 1 Response Summary

Q. 5
Please describe how you use digital technology and computers in your practice / printmaking - for example how do you use it in process, promotion, exhibition, communication etc.
"I use the computer when I want to enlarge my sketches before I transfer them in the linoleum or when I want to use a particular font."
"I use digital technology to make analogue films (for use in silkscreen, photogravure etc). Also, I use it to make web pages, read art news and stay in touch with artists."
"Although I work in "traditional " linocut, I may use scans of my drawings to test negative and positive images by reversing the black and white. Sometimes I also use the "mirror" function to reverse the image before carving. However, since I usually do my final drawings on tracing paper, I just flip the paper. I have also created positives of my drawings to expose for relief solar plates."
I only use digital imagery for layout purposes.
Just to print off images I'd like to make as a plate. When I'm done, I use digital cameras to photograph the piece.
I use a digital camera and computer to create images, but not to print them. Technology is used as a tool to help create images I otherwise could not on my own.

Figure 2: Sample of responses from a survey of 45 international printmakers.

Pilot 2 – Peer discussion groups

Figure 3 (below) illustrates a sample of replies to a discussion initiated by the researcher – which asked

Does the term “printmaking” truly reflect the diverse and extensive art form?

Might we better describe it as “Print Art”?

What term or phrase do you best think describes our practice in the 21st century?

Initial responses to this discussion were, although valid, small in number. This result has raised questions with the researcher as to its response rate and if discussions alone are the best tool for eliciting data from the networks and affinity spaces being studied.

After a period of reflection further work is was directed into the methods and mechanisms used in the pilot. Work involved test questions being sent to the network to compare responses to a) questions concerning technical traditional printmaking matters such as papers and inks, and b) questions concerning philosophical matters relating to print. Concurrently the researcher has joined the SIGGRAPH network to examine responses within this forum to questions associated with digitally mediated print art.

Replies to This Discussion



Reply by FORTH ESTATE on January 21, 2010 at 11:41am

Art of the Multiple

[► Reply to This](#)



Reply by Brandon Sanderson on January 21, 2010 at 1:22pm

I think "Printmaking" is fine. The name itself isn't so important as the context in which it is used. If you're going to call something "Print art", should we then call a painting "Paint art"?

[► Reply to This](#)



Reply by Matt Rebholz on January 22, 2010 at 8:14am

Personally, I love the term Printmaking. I think the very the word Printmaker evokes labor and working in the shop (rather than the studio), and reminds us of the democratic and populist nature of our medium. Words are very important and they are encoded with subtle messages. To call Printmaking Print Art would seem an attempt to turn our backs on the hundreds of years of history and tradition that we carry with us. Of course it is art, I see no need to remind people of that fact.

[► Reply to This](#)



Reply by wrichard repasky on January 22, 2010 at 10:42am

I suppose "printmaking" is a term that is recognized by the makers of prints as well as the non-makers and has survived for generations.

"Print Art" makes my mind go toward the un-editioned or un-published print or the collision with other mediums – like clay or canvas.

With the inclusion of new tools and technology in contemporary practices over the last 10 years I'm getting fond of the term "printmedia" but I'm not sure I'd ever call myself a "printmedia-er." Mostly I self-define as a printer or a printer with a reference to a specific medium.

[► Reply to This](#)



Reply by Richard Wohlfeiler on January 24, 2010 at 8:25am

In our department the term Print Media has been officially adopted (used in the university catalog & department website), although Printmaking seems more widely used in conversation/discussion. I like Print Media because it suggests the inclusion of expanded methodologies and contemporary technologies as well as traditional practices. I have sometimes encountered resistance to some newer approaches on the grounds that they are not really authentic "printmaking".

[► Reply to This](#)

Figure 3: Sample Discussion - Network / Affinity Space

Pilot 3 – Physical interview

A pilot interview was undertaken with the Print Studio Director of Dundee Contemporary Arts. Structured around open questions (see Figure 4 below) the interview was conducted as part of a visit and tour of facilities during January 2010.

Questions used in Pilot Interview January 2010

Q1 What does digital printmaking mean for you?

Q1.1 and your organisation?

Q2 What sort of use of digital process do you have here?

Q2.1 What sort of take up has it had?

Q3 Is it being used as a tool in part of traditional processes?

Q4 Are any of the artists here using it more as a medium? e.g. scripting generative art etc?

Q4 How do you think digital has changed or is changing the process of making?

Q5 Where do you see the points of change between traditional print and any new forms emerging as a result of digital processes?

Q6 There has been quite a bit of discourse about permanence, materiality, and authenticity what are your views on these areas in the light of digital process?

Q7 A major element of print is about signature & authorisation - some artists really concerned about this in the digital medium - what do you think?

Q8 Artists are using the web to collaborate sell and exhibit – what sort of things is this organisation up to?

Q9 How do you think the web has changed how a studio such as this operates (if at all)

Q10 Who would you say are the innovators in this area within this organisation?

Q11 What do you think are the major issues surrounding digital we will face in the future?

Figure 4: Pilot Interview Questions

The interview was digitally recorded as an audio file and transcribed the pilot evidenced that the mechanism was stable and generated sufficient data for meaningful analysis. The pilot interview although undertaken to develop and test the validity of the process additionally raised, through responses and questions surrounding signature vis-à-vis signature of the process – a concern of the traditional printmaker in response to questions of

the original print over the reproduction. This finding directed consideration of the relationship of "process signature" to "Aura" (Benjamin, 1936) and "Simulacra" (Baudrillard, 1999).

APPENDIX IIa Research Design - Map of Research Elements to Survey Questions

Relating to Research Element: - New Materiality & Signature.

Target – participants in “Primary Research – Peer Practice – Born Digital - New Materialities”	
Topoi of Review from Contextual Review	Survey Questions
Post-physical forms.	<p>Electronic Prints</p> <p>Traditionally printed media such as books, magazines and newspapers are increasingly being published in non-physical forms such as internet, kindle and eBooks.</p> <p>What do you think this might mean for the practice of printmaking practice?</p> <p>What artistic opportunities might these non-physical print forms present for you?</p>
Fluid permanence reversible process.	<p>Flexible Processes</p> <p>Digital processes give the print artist the potential to use flexible and changeable processes for example add / remove /shift layers and separations, change colours quickly and edit brushes. In effect the artist has the potential for reversible process and thus permanence in their work can become fluid.</p> <p>What do you think the implications of “Fluid permanence / reversible processes” to artistic practice are or could be?</p> <p>Is there any aspect of this evident in your own work?</p>
Beyond signature.	<p>Signature</p> <p>Although the production of work through the digital print medium is now well established, issues of originality with respect to signature still exist.</p> <p>What do you think about this?</p> <p>Do you think there is the possibility of using differing forms of signature e.g. digital watermarking</p> <p>Could you suggest any new methods of signature?</p> <p>What might be the implications of this be for your practice?</p>

Relating to Research Element: - Modes of consumption.

Target – participants in “Primary Research – Peer Practice – Born Digital - New materialities”	
Topoi of Review from Contextual Review	Survey Questions
Curating the digital.	Digital Curating Have you participated in / or organised exhibitions, print exchanges etc which were facilitated / curated using digital methods? What methods were used? How successful where they? How might you use digital methods for / facilitation / curation in the future?
Networked collaborations – the digital atelier	Printmakers Networks To what extend do you get involved in digitally networked collaborations through the internet e.g. Inkteraction Print Universe, Facebook etc? What form does this take e.g. information exchange or collaborative printmaking etc? Describe any significant things that have happened through online printmakers networks?
The on-line marketplace.	Selling On-line Do you use online mechanisms (for example ETSY or EBay) to either sell or promote your work? What is the extent of your involvement? Which in your opinion is the most suitable for printmakers?

Relating to Research Element: - Emergent forms.

Target – participants in “Primary Research – Peer Practice – Born Digital - New materialities”	
Transition to new printmaking.	New forms of printmaking What is the balance and /or relationship of traditional and digital methods within your practice? Do you think it is possible that new ways of practicing might evolve through digitally mediated printmaking? What forms or directions might they may take? If you use digital technologies within the specific print making practices in your workshop or studio could you please explain how - for example in process, promotion, exhibition, communication etc?
Artistic practice.	Your artistic direction. Please describe your personal ethos with reference to your artistic direction, approaches to innovation and new techniques in practice?
Academic discourse.	The influence of academic discussion. Could you tell me if any of the recent academic discussions as to the significance, role and relationship of digital technologies and processes in printmaking practice have affected you and your practice in any way? What, in your opinion are the most significant (if any) of these discussions?

Relating to Research Element: -The philosophical context of the digitally mediated art object.

Target – participants in “Primary Research – Peer Practice – Born Digital - New Materialities”	
Topoi of Review from Contextual Review	Survey Questions
“Aura”.	<p>Aesthetics and Connoisseurship</p> <p>What do you perceive the distinctions (if any) between digital and traditional printmaking to be?</p> <p>Walter Benjamin suggested that technologically reproduced artwork loses it's “aura”. In addition the aesthetic of connoisseurship may be diminished for some viewers.</p> <p>What is your opinion on suggestions that that the “aura” or connoisseurship is lost in the digitally mediated print?</p> <p>Do you think there is the possibility of new or differing states of “aura” or connoisseurship</p> <p>Do considerations of “aura” or connoisseurship affect your approach to your practice?</p>
Digital Medium & Simulacrum.	<p>Production and Re-Production</p> <p>Digital processes provide the theoretical possibility for the endless production and re-production of the digital print, What are your views on this?</p> <p>How might this possibility affect your approach to practice?</p>
Materiality & permanence.	<p>Permanence</p> <p>Given developments in printing technology, inks and papers, do you think that early criticisms concerning the material nature and permanence of the digitally mediated print are now receding or are still valid?</p>
Instantiation and temporal form.	<p>Print On-Demand</p> <p>It is possible, with digital mediation, to develop “prints” which may normally stay in a “virtual” state until the artist or the spectator chooses to make it physical by printing it themselves or ordering a print from the artist.</p> <p>How do you think this might affect your printmaking practice in the future?</p>
Authenticity.	<p>Authenticity</p> <p>The adoption of digital methods has led to concepts of authenticity being questioned.</p> <p>What do you think “authenticity” is in the digital age?</p> <p>If you make or were to make digital prints, what would make them authentic?</p>

APPENDIX IIb Artist survey

"Born Digital New Materialities"

Artist Survey

Name	
Email	
Date	

1.1 Technology and you.

a. What would you define digital technology as?

b. To what extent do you use digital technology in your day-to-day (non-printmaking) life?

c. Do you use digital technologies in your printmaking practice? – Please explain why you do or do not.

d. If you use digital technologies within the specific print making practices in your workshop or studio could you please explain how - for example in process, promotion, exhibition, communication etc?

1.2 Your artistic direction.

Please describe your personal ethos with reference to your artistic direction, approaches to innovation and new techniques in practice?

1.3 The influence of academic discussion.

- a. Could you tell me if any of the recent academic discussions as to the significance, role and relationship of digital technologies and processes in printmaking practice have affected you and your practice in any way?
- b. What, in your opinion are the most significant (if any) of these discussions?

1.4 New forms of printmaking

- a. What is the balance and /or relationship of traditional and digital methods within your practice?
- b. Do you think it is possible that new ways of practising might evolve through digitally mediated printmaking?
- c. What forms or directions might they may take?

2.1 Electronic Prints

- a. Traditionally printed media such as books, magazines and newspapers are increasingly being published in non-physical forms such as Internet, kindle and eBooks. What do you think this might mean for the practice of printmaking practice?
- b. What artistic opportunities might these non-physical print forms present for you?

2.2 Flexible Processes

- a. Digital processes give the print artist the potential to use flexible and changeable processes for example add / remove /shift layers and separations, change colours quickly and edit brushes. In effect the artist has the potential for reversible process and thus permanence in their work can become fluid.

What do you think the implications of "Fluid permanence / reversible processes" to artistic practice are or could be?

- b. Is there any aspect of this evident in your own work?

2.3 Signature

- a. Although the production of work through the digital print medium is now well established, issues of originality with respect to signature still exist. What do you think about this?

- b. Do you think there is the possibility of using differing forms of signature e.g. digital watermarking?

- c. Could you suggest any new methods of signature?

- d. What might be the implications of this be for your practice?

3.1 Digital Curating

a. Have you participated in / or organised exhibitions, print exchanges etc which were facilitated / curated using digital methods?

b. What methods were used?

c. How successful where they?

d. How might you use digital methods for / facilitation / curation in the future?

3.2 Printmakers Networks

a. To what extend do you get involved in digitally networked collaborations through the Internet e.g. Inkteraction Print Universe, Facebook etc?

b. What form does this take e.g. information exchange or collaborative printmaking etc?

c. Describe any significant things that have happened through online printmakers networks?

3.3 Selling On-line

a. Do you use online mechanisms (for example ETSY or EBay) to either sell or promote your work?

b. What is the extent of your involvement?

c. Which in your opinion is the most suitable for printmakers?

4.1 Aesthetics and Connoisseurship

a. What do you perceive the distinctions (if any) between digital and traditional printmaking to be?

b. Walter Benjamin suggested that technologically reproduced artwork loses its "aura". In addition the aesthetic of connoisseurship may be diminished for some viewers.

What is your opinion on suggestions that that "aura" or connoisseurship is lost in the digitally mediated print?

c. Do you think there is the possibility of new or differing states of "aura" or connoisseurship?

d. Do considerations of "aura" or connoisseurship affect your approach to your practice?

4.2 Production and Re-Production

a. Digital processes provide the theoretical possibility for the endless production and re-production of the digital print, What are your views on this?

b. How might this possibility affect your approach to practice?

4.3 Permanence

Given developments in printing technology, inks and papers, do you think that early criticisms concerning the material nature and permanence of the digitally mediated print are now receding or are still valid?

4.4 Print On-Demand

a. It is possible, with digital mediation, to develop “prints” which may normally stay in a “virtual” state until the artist or the spectator chooses to make it physical by printing it themselves or ordering a print from the artist.
How do you think this might affect your printmaking practice in the future?

4.5 Authenticity

- a. The adoption of digital methods has led to concepts of authenticity being questioned. What do you think “authenticity” is in the digital age?
- b. If you make or were to make digital prints, what would make them authentic?

Thank you for completing this survey, which is part of research being undertaken by Paul Thompson at Grays School of Art – Robert Gordon University.

For further details of this project visit:

http://www.printmaking2-0.info/about_research.htmlOr

<http://www2.rgu.ac.uk/subj/ats/research/students/thomson.html>

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APPENDIX IIc Extracted responses from extended artist surveys

Australia	1. Eleanor Gates-Stuart 2. Ross McMaster
Norway	3. Astrid Elizabeth Bang
Serbia	4. Snežana Kezele
UK	5. Alfons Bytautas 6. Alastair Clark 7. John Haworth 8. Sarah Hendry 9. Ray Henshaw 10. Roy Petrie 11. James Faure Walker
USA	12. Deborah A Cornell 13. Heather Freeman 14. Anthony Holmquist 15. Dorothy Simpson Krause 16. Jeff Murphy 17. Rebekah Tolley

Table 1: Artists responding to Extended Survey of Practitioners.

Emergent forms.

1.1 The technological context.

1. I use digital technology to capture images, such as a camera or a flat-bed scanner, and use these in my prints. The files are either used as the raw images themselves or reworked through Photoshop. (Gates-Stuart, 2011 , Edinburgh-Printmakers, 2011)
2. I work with images, the printmaking practice is not so important to me. I first worked with photography, which I printed, digitally at a company that specializes in printing for artists. Gradually I started reworking my photos digitally. also making digital prints. However, I found it very costly to produce and frame these digital prints. I discovered video art. Now I can create works and get it displayed to an international audience without the

costly process of printing and framing. For exhibition and sales purposes, I use a company specialised in digital prints. I deliver a CD with a digital files. They print out test prints, I get a chance to judge the colour of the print. Then a final print is produced and i.e. mounted on an aluminium plate.
(Respondent-3, 2011)

3. I use digital tech in some of my printmaking. Digital is convenient over traditional practices, but has as yet to be proven, developed and adopted alongside the familiar disciplines, therefore its status is to be questioned - but not feared. Digital offers much in the hands of those who would experiment with changing perspectives. Digital offers a means of exploring how the end result of traditional methods can be reassessed and perhaps advanced. The process is chemical-free and can also serve to create exhibition material, plus communicate with an enlarged audience.
(Respondent-10, 2011)
4. For me, the process of creating is at the core of producing artwork. A completed piece will continuously drive to the next idea or concept, much like a composition of music. An image printed in a traditional manner may be the end product, or will be a starting point for a new piece. By scanning images into the computer or cutting out sections of prints to reassemble, the reconstructed elements breathe and harmonize with each other in new and appealing ways. I use the computer to develop imagery that will be printed onto a film and used for solarplate or photolithography. I use a laser printer and computer to print onto pronto-plates (Respondent-14, 2011)
5. I use digital separations to make screens for screen-printing and also I make digital prints. I find that this is the most appropriate method to express my ideas in my work. I have a website for promotion and I make exhibition publicity materials with In Design. (Respondent-8, 2011)
6. Digital printing technology is not an alternative but complementary ...
...to traditional types of printing.(Respondent-4, 2011)
7. I actually got into traditional printmaking via digital technologies. I began working as a graphic design and animator using exclusively digital platforms such as Photoshop and After Effects. It was through creating digital prints that I began to experiment creating hand-made works for scanning and re-configuration in with digital tools.
(Respondent-13, 2011)

8. I use digital technologies in all elements of my creative work and artistic life. All my promotional works are designed on a Macintosh. All of my photographs begin digitally. All my work gets run through the computer before ending up on fabric. It allows me to experiment to a greater degree. (Respondent-16, 2011)
9. (Uses Digital)because it's faster, easier and less expensive than traditional methods of creating transparencies in the darkroom for example. Less chemicals! ... for creating transparencies to expose in a variety of photo-based printmaking methods or for printing direct to plate. I also use programs like Photoshop to test colours I may want to print and separate layers etc.(Respondent-17, 2011)
10. The computer is my primary tool for creating both still and time-based art, the repository of my archives and database information and my means of communicating with the world, both through email and other postings and interactions. - Virtually all of my art-making begins in the computer. Much of my work is digitally printed or transferred from digitally printed film. - I use the computer to create catalogs and other promotional materials, write articles, layout exhibition spaces, etc.(Respondent-15, 2011)
11. Yes, extensively. It's a natural tool for me. Linking and transforming source material to reform it, sketch and transform. Much of my imagery is based upon photographic and digitally originated scans. - As a way of developing ideas and sketching, producing print out sketches. In the process, to manipulate and enhance images and prepare them for output onto film for photo mechanical printmaking or for output onto paper. For documenting and promoting work by organising images and publishing to websites, promoting to galleries and preparing exhibition applications(Respondent-6, 2011)
12. I do not think of myself as a printmaker, but as a painter... painting as a form may be easier to adapt to incorporate the joys of digital methods. I now find it inconceivable to pursue the art of painting without all this stuff. But I see the use of the printer as diminishing, because the steps between drawing on the Wacom, painting or drawing... or drawing on the wall using a projector... all these ways of testing out images can be done without the fuss of printing out something on paper... and anyway producing the thing in paint is a lot more malleable, obviously. A key point in the distinction between printmaking and painting is that with a painting you can keep working on it, adding, subtracting, from part to part, until the last moment, treating it as a unified whole. With a print process, whether digital or litho,

screenprint etc, your decisions, additions, corrections are global. On the other hand, now and then I decide on a suite of 'prints' and they go off sideways from this process. (Respondent-11, 2011)

13. I do use it a lot. Accessing images, colour separation, digital output of positives for stencil making, dissemination of work etc.(Respondent-2, 2011)
14. Yes. Considerable potential for exploring surface properties, which resonate with my ideas. (Respondent-7, 2011)
15. I developed early ideas in my practice of photographic representations of space being abstract. Die, ink on paper. Initially I developed paintings, which I still term as paint-scapes, based on ideas stemming from photographic space and observation. Primarily because working in an environment like Belfast, which has long history of observation and surveillance. On from these early paintings grew an avid interest in photography, which runs through my print making today. Moving away from purely abstract notions onto ideas about society, and currently citizenship. (I use digital) process for Separations and adapting photographic imagery for use in screen prints. In promotion through my websites, and those of international printmaking groups, also through a recent blogs. I exhibit pure digital images as part of installations or as stand alone images.(Respondent-9, 2011)
16. A new language, a new means of communication for ideas, sounds, words & images. Digital technology is now very much part of my work and printmaking practice, when working with students or making my own prints. , I use scanning and Photoshop to produce digital positives for a wide variety of techniques from cyanotype to CMYK screen-printing. Used as part of the making process but also to develop & refine ideas. (Respondent-5, 2011)
17. I make digitally mediated traditional prints (photo etching and litho, mixed media), digital prints, digital installations that utilize my prints, and 3D virtual reality projects also utilizing some of my printed works. I use digital means largely because of technology being a partial referent – my work concerns the impact of human presence and technology on the physical environment and on natural processes (including global warming and genetics) thus the use of technological means underscores the content and broadens its potential. In regard to process, I also have come to value its inherent freedom of form – images and structures can migrate their physical

existence and be regenerated into a variety of spaces and environments.
(Respondent-12, 2011)

1.2 Artistic practice.

1. I am very excited about innovative practice and techniques for printmaking practice and look forward to finding opportunity to maintain this interest through my research. (Gates-Stuart, 2011)
2. I am interested in innovation and learning new techniques. I am open to making use of and exploring new technology. In my projects I search to always do something/express something others have not done before me. Sometimes just by exploring a technology something interesting appears, unintentionally. That fascinates me. (Respondent-3, 2011)
3. Witnessing one's own living experiences, which, now of course cannot exclude the digital. I exist at a defining moment for many artists. A time of massive change, whether the digital is used as a preparatory aid for traditional forms of expression or as a means to create a digital end product. As much as the development of oil paint was to change the work of artists of old, this new tool is for the unborn artists to come. (Respondent-10, 2011)
4. I am always keen to experiment with new technologies and programs; I don't feel that you always have to be an expert to get the best results sometimes the early experiments produce the most raw and interesting pieces before you start refining them with all of your new knowledge. (Respondent-8, 2011)
5. I go back and forth between creating works digitally, printing them out, reworking them by hand, scanning them back into the computer and then repeating the process multiple times. But I also often submit my works for exhibition on-line and I haven't sent out slides in over two years. I maintain blogs for some of my projects (<http://pennipotens.blogspot.com>) and primarily use my portfolio website (<http://www.EpicAnt.com>) for soliciting exhibitions. Of course, I also teach Digital Media and am constantly looking for new ways to interweave digital and traditional technologies in my classes. Lately, for example, my students and I have begun experimenting with laser cutting wood for woodblock printing. (Freeman, 2011)
6. I have always embraced new technologies. I work with digital tools as they are dynamic and always changing. This allows me to keep experimenting. (Respondent-16, 2011)

7. I am inspired by the many innovative and varied applications of digital media in contemporary art, I think it opens up new possibilities in traditional mediums. I think printmakers have always adapted to new technologies to push the medium. (Respondent-17, 2011)
8. I like to explore and play. New things offer new possibilities which can be an interesting thing to respond to offering alternative ways of creating and transforming an image or idea. (Respondent-6, 2011)
9. It is implicit in the works I have made over the past, well, fifty years. It is up to someone else to make of it what they will. (Respondent-11, 2011)
10. My personal ethos is anything goes, beg, borrow and steal new techniques and then develop them into more innovative structures and then put them back into the public arena and see what someone else can do with the idea. Don't hold back and don't compromise your ideals to make a sale. My work is based on political, religious and social commentary and is not what you would describe as highly commercial. (Respondent-2, 2011)
11. I'm currently interested social politics, in marking my or other people's existence. In relation to marginalised or people with little voice. I'm also interested in referencing art history, utilising text, Doing so through prints, books, installations, photography, and occasionally paintings. I'm also interested in notions of form and space. (Respondent-9, 2011)
12. New techniques are new tools and can lead to new ways of thinking and making. As a print technician in a university fine art print studio, I have to be open to new (and often bizarre) ways of thinking. I can offer in return experience gained from working with "traditional" print processes in a hands-on way. My ultimate aim is to marry new thinking and new technology with the sensibilities gained from working with skill-based print media. (Respondent-5, 2011)
13. The forms I use follow the exigencies and demands of content (see comments in 1.1c) – thus I have redefined the scope of my work many times as my visual interests and concerns transform. Sometimes this involves the use of cutting-edge 3D technologies such as the Immersa Desk, the Deep Vision Display Wall, large-scale video, etc. This also applies to my print practice. I use most of the print media, but recently have focused on digital printmaking as an under-utilized, demanding, beautiful and powerful form of print. I use whatever medium seems to command the situation – for its aesthetics and its range – and whatever I can find or invent to best realize my goals. (Respondent-12, 2011)

1.3 Academic discourse.

1. I must admit, I have not followed the academic discussions, I do not know what these are. But I do visit exhibitions with digital prints. My impression is that it is now accepted and sold as recognised art. Since more and more artists make digital prints, the galleries have accepted this as a graphic method alongside traditional methods of printing. However, I have not seen any statistics as to how well “the market” has accepted this art form.
(Respondent-3, 2011)
2. I tend to disregard it (Respondent-8, 2011)
3. I attended on any discussion of its kind. (Respondent-4, 2011)
4. Some discussions on craft seem to keep coming up. Very interesting and relevant as a teacher of undergraduate art and design students. In fact, the Adobe Museum just posted a great lecture by John Maeda that addresses this issue. (Respondent-13, 2011)
5. I’m sure they have, though putting a specific conversation in this context isn’t possible. It’s an ongoing dialogue. The widening parameters of what is considered “printmaking” is probably the most notable of all the things I discuss with my peers. (Respondent-16, 2011)
6. Only in that those discussions have supported and validated my practice and interest in digital media. I think however, digital printing struggles to find its place, I think printmakers still value the traditional hand inked/printed work over the machine printed. In this sense it is not an equal, it is its own thing. (Respondent-17, 2011)
7. They haven’t. (Respondent-15, 2011)
8. It’s good to keep informed about other peoples practice and opinion but mostly I like to make my own mind up as to how I like to work. Inevitably the climate of debate informs you, whether consciously or subconsciously. (the most significant is)... The traditional printmaking world largely coming round and adopting the creative potential and validity of digital print. (Respondent-6, 2011)
9. What academic discussions? I was much more involved in conversations with colleagues, most of whom felt isolated, some fifteen to twenty-five years ago, when art schools, especially in the UK seemed only to tolerate computers in graphic design departments. Printmakers tended to be conservative, to say the least, and simply didn’t get what it was all about. Maybe they are still talking about paper thickness, ink quality, permanence, and their ‘fine artness’. They were the last to join the party... and maybe some are talking about it because it’s now old news, i.e. safe for academics

to chew over. Aside from that, I guess my approach is pragmatic, that is to say technical, and with the digital side I am self-taught, more or less.
(Respondent-11, 2011)

10. I have not seen or heard any academic discussions relating to digital technologies and processes in printmaking practice, and believe these discussions are superfluous to the production of contemporary visual art. Digital is just another new tool, in the same way that lithography and screen-printing were new tools, born out of industrial/commercial processes and then utilised by innovative visual artists. It is our duty as contemporary visual artists to embrace new technologies. (Respondent-2, 2011)
11. No, I've attended several academic conferences, one recently in Belfast on terminology, which I got very little from, as definitions I don't find important for me in my working practice, im interested in expression, ideas about humanity, and how we address and articulate our society in a coherent way. The mechanics of getting my point across can be varied. Impact conferences have been interesting, the Key Note speech of William Kentridge, and other speakers in South Africa, were of importance to me, primarily because of their art in relation to the civil, echoes with what I would like to do. Michelangelo Pistoletto has interesting ideas on the role of the artist. Other 'impacts' have addressed other areas of technical interest, but largely been academics peacocking. (Respondent-9, 2011)
12. The discussions have not directly affected me so much as they have reiterated realizations I have experienced in my practice. Theory seems to follow from practice for me. (For example – because I use some of the same images in my etchings and as digitally transformed objects in 3D electronic space, discussions oriented around the capability of electronic forms to transform between tactile and insubstantial is something I experience daily and have discussed at length with others. I think the most significant and the one that has the most potential impact for tactile printed forms is the role of code in digital imaging and media. Two issues stand out. First, that the coded image can and does have a life in almost any form – sculpture, video, print, streamed information, light, even as sound. This capability is something we have not experienced before in artmaking. The second is the insubstantiality of the 1's and 0's of the code. In essence, it is only the arrangement of these that makes them recognizable by humans, and only our cultural assumptions that make them art. The digital creation then becomes defined as the arrangement of electronic impulses. The image does not exist as matter until it is "output" in a form. This raises the question of

the efficacy of printed works as a form within the larger field of electronic media. Print must keep a relevance to these new developments if it is to be a viable rather than an antiquated form.(Respondent-12, 2011)

1.4 Transition to new printmaking.

1. 50/50 (balance and /or relationship of traditional and digital methods) – although the percentage is not that specific really as it depends on the direction of the work and the best method for the idea. I try to aim for a non-technological look, whatever that means, a personal ‘signature’ – a human presence. New forms of practice - as a theoretical model and within practise (as) Communication, Media, Digital histories and archive, Web 3.0, Mapping(Gates-Stuart, 2011)
2. I only work digital, all the way.(Respondent-3, 2011)
3. It differs from project to project, currently digital is the most relevant media for me.(Respondent-8, 2011)
4. Both are equally represented (in my work)(Respondent-4, 2011)
5. Yes, and I think it’s happening all the time. But practice is often different than content. I think mobile devices will start impact print soon... perhaps they already are and I just don’t know it. Augmented Reality as well... I’m sure it’s already worked it’s way into print conceptually, just not sure how it’s going to happen physically.(Respondent-13, 2011)
6. I actually came into printmaking from the digital realm, so almost all of my work is untraditional. (Respondent-16, 2011)
7. On new ways of practice - I’m not sure how they will evolve, but no medium is outside the sphere of digital influence.(Respondent-16, 2011)
8. Printmaking is very physically exhausting and spending a lot of time in the studio, even with newer less toxic methods it can be a drain on your system. Working in the computer gives me a break from the studio and working in the studio gives me a break from the computer. I use traditional printing for teaching and participating in portfolios and to do things I can do in the computer. I use the computer to develop prints and ideas and for developing computer based imagery whose final output may be a print or an animation.(Respondent-17, 2011)
9. At the SGC printmaking conference I was very interested in panel on printmaker’s using animation because I am involved in developing animated sequences myself. As I printmaker I am interested in the variation in the

multiple and the animation allows me to take advantage of subtle variations in the imagery I work with. (Respondent-17, 2011)

10. I use very few traditional printmaking forms. – Absolutley (thinks it is possible that new ways of practising might evolve through digitally mediated printmaking) - The computer makes the transfer/ monoprint process very easy. It's also easy to make printing plates and stencils (with an engraver). (Respondent-15, 2011)
11. I increasingly use largely digital methods and originate works digitally, occasionally completing works digitally. I like to incorporate digital with traditional print methods to deliberately slow down the process focus ideas and achieve a richer physical ink quality. I like to use paint and ink and incorporate the accidental that occurs and relish the 'here and now' decision making of working with physical materials. I've been producing painted/printed objects. (Including new ways of working) - Working remotely from collaborations, long-distance interactions and collaborative working, Virtual portfolios and exhibitions. (Respondent-6, 2011)
12. In time spent? In quantity of output? In square footage of output? Oh well, let's say fifty fifty, but then I wouldn't make a distinction. How long do you have to keep doing the same thing before it becomes a tradition? 20 years? Well, then digital is traditional for me. Then, I have been using some felt tips for the past year which are new to me... so they are the innovation. In my opinion... time to stop asking that question... this stuff is here to stay... just get on board... or not if you don't want to. (Respondent-11, 2011)
13. 50/50 – (directions for new forms) Digital giclee print to high end art paper, online only dissemination of work, the non physical production of prints and the removal of the press/print workshop from the work practice. (Respondent-2, 2011)
14. 75%digital 25 %traditional - One way is new approaches to photo-ethnographic projects such as 'The Way We are Now' and 'A day in the life of----' See Developments : projects at www.creativity-embodiedmind.com (Respondent-7, 2011)
15. It would be around 30 percent of my practice. It supports and sometimes takes a leading role depending on the ideas trying to be communicated. New ways of practice evolve all the time, there is a anxiety about Digital technologies devaluing printmaking. But I think it offers new modes of expression, as it is sympathetic to one of printmaking's main attributes the 'multiple'. I think it 'may' lead to more conceptual work, and therefore print artists being taken a touch more seriously by the wider contemporary art

world, and competing with painting, installation, video and sculpture.

(Respondent-9, 2011)

16. 85% Traditional / 15% Digital perhaps (difficult to evaluate!). almost certainly (thinks new forms will evolve) - Not sure – but look forward to seeing them.(Respondent-5, 2011)

17. I use both, as needed. At this point, digital media for me are both embedded in my printed forms (traditional and digital) and they exist outside my print practice too. So I would have to say I use digital means heavily. - New combinations of tactile and digital means are only just starting. I could imagine projections combined with printed surfaces, digital print installations that are presented simultaneously in various locations, etc. Transglobal exchanges are beginning also. (Respondent-12, 2011)

New Materiality & signature.

2.1 Post-physical forms.

1. I think it is exciting and the challenge will be to 'add value' to the experience of the traditional object into a new dimension.(Gates-Stuart, 2011)
2. I often ask myself if the role of the printed image is vanishing. More and more digital screens are popping up on all arenas. At the waiting rooms of dentists, doctors. At shopping centres, in the lounges of hotels. Places that a few years back, might of displayed graphic art, are now being substituted by digital screens. These digital screens have to have some content. Maybe this is the future display for digital images. Maybe digital prints as an artform will never take off?(Respondent-3, 2011)
3. ART and Printmaking will survive the current digital circus of plagiarism and quick-fixes based on software facility and novelty.(Respondent-10, 2011)
4. Physicality is important to some works so they will be printed. I hate those digital photoframes that you get now, what a waste of energy!(Respondent-8, 2011)
5. I think artist books are going to have a renaissance. (P)ost-modernism necessarily leads to the Romantic, I believe.(Respondent-13, 2011)
6. Notions of craft will disappear only to materialize again when the culture bemoans the disappearance of the object. We can reach a much larger audience on the Internet. So, I have taken advantages of online exhibition spaces such as those provided by Siggraph, <http://siggrapharts.ning.com/> and other online arts communities. (Respondent-16, 2011)

7. Media culture and printmaking are very closely linked. Printmakers are excited about imagery no matter what format it takes. (Providing) - More rapid and broader communication and sharing across cultures, lowcost, free access. Printmaking has always been democratic. More people can see your work more easily. Resolution need not be high enough to print so that the printmaker is not giving up their original code if they have a higher quality source to print from. (Respondent-17, 2011)
8. eBooks can become both more and less than physical books. The ability to continuously scroll, have unlimited virtual space and embed links and video add a level of richness achieved no other way. I have done page turning flipbooks and intend to explore other options as time and energy allow.(Respondent-15, 2011)
9. Artist can easily create and publish and distribute virtual collections of works, artists-books and catalogues. (Providing)... The opportunity to conceive and create collections of work, which can be created and shared without a budget.(Respondent-6, 2011)
10. Every method, every genre is a development out of another. But... generally, the technological innovation never catches on till the culture, or the habits of the interested parties, finds value in it. For a long long time the 'printmaking' community was sniffy about anything digital because, clearly, it presented a threat to their expertise, effectively their closed shop. There have been considerable advantages in 'digital' art growing up as an outsider kind of art. Some disadvantages too... ie paranoia. As to having a 'print' on an iPad etc.... I don't think so. It is a different medium. I use one all the time, but don't find the paint programs on it too hot. Maybe I'll change my view on that. (Respondent-11, 2011)
11. There will always be a need for physical prints as art is a display item, to be displayed on your wall, where as traditionally printed media such as books, magazines and newspapers are viewed more as throwaway consumerist product. (New opportunities) Dissemination of work and ideas and gathering of images and ideas. Exposure to a far flung audience. Access to sales.(Respondent-2, 2011)
12. They may have a very significant impact, since traditional printed media find it too expensive to produce many fine art images in an article. (Respondent-7, 2011)
13. The printed 'object' and its appreciation, its physicality will remain endearing to those who like beautiful or stimulating objects. The digitised age lacks permanence somehow, although it floats in the digitised cloud, is that

enough? An object still remains tangible, and some how desirable to people. (In terms of new opportunities) A means to circulating and exchanging interesting images and ideas with other artists and writers, which is always invaluable. Financially no money has yet to come my way directly. Only Indirectly and this has been minimal. (Respondent-9, 2011)

14. New avenues will open up but I think it will also result in a re-evaluation of the qualities of the printing process versus digital media, leading to an appreciation of hand skills (probably working in tandem with digital technology) and a real understanding of the contribution the physical materials of print (ink, paper, etc.) make. (Respondent-5, 2011)
15. It might mean exciting venues for artists whose work reads well in these contexts. For myself, my work is more of a visual essay and free-standing, so these visual-culture contexts may not work particularly well for me. Streamed video or time-based forms presented on the Internet might work better, especially as these forms improve their "broadness" and resolution. Much of the detail of my work is lost in low-resolution images. (Respondent-12, 2011)

2.2 Fluid permanence reversible process.

1. This is something I have been doing for a number of years. Having a traditional printmaking background is very useful as I tend to draw on this experience in the process of building my images – creating and using layers. I am interested in the digital activity as a process, documenting the journey / unpacking creativity, as in the method of making and storing information. (Gates-Stuart, 2011)
2. Yes, I use all these possibilities. Sometimes, I think I am finished with an image, but then I can rework it. I often entitle my work version 1, version 2. But in the end I end up with a final version, with a title. (Respondent-3, 2011)
3. If the Artist is the driver then we might have a new experience of value, if in effect the software is the creator then we reduce ourselves. (Respondent-10, 2011)
4. Printmaking is bloody expensive –it could save us starving artists a fortune! (Respondent-8, 2011)
5. ... I'm so embedded in them... I have no sense of practice without them. (Respondent-13, 2011)
6. In an odd way, this adds the idea of uniqueness back into area of digital production where so much of the discussion has centered around the idea of

the copy. I have had works that I exhibited, then later modified, and exhibited again – each one of these states ending up in unique digital images as I never was disciplined enough to keep all the files as the work evolved.(Respondent-16, 2011)

7. Endless possibilities in which to explore one's imagery. Can't always be reproduced on paper - I use a lot of variations of imagery to develop my animated sequences.(Respondent-17, 2011)
8. It's a way of working that enables risk taking and boundary pushing – resulting in more creative work. My work is based upon these possibilities for change. In Photoshop, my files typically utilize a dozen or more layers to achieve the final piece. (Respondent-15, 2011)
9. Artists can explore a wider range of options easily. Decision making becomes more important in selecting, editing and ultimately choosing when a work is deemed to be resolved and finished before picking which version is to be shown to represent that body of work/range of virtual states. - I work in series more than before.(Respondent-6, 2011)
10. This needs a v short or a v long answer. The undo function is undoubtedly like a safety net, but I guess knowing it is there gives you confidence, so I don't often use it to the extent of going back. I work towards resolving a drawing/painting/print (not much distinction there) as best I can. For a longer answer.... I wrote a book called 'Painting the Digital River' (Prentice Hall , USA 2006) which goes into this... but doesn't come up with a decent answer either.(Respondent-11, 2011)
11. They are useful in the design of finished pieces, but a finished piece is a finished piece. If you go back to a piece and change it, then this becomes a new work in it's own right, and the original work becomes state of the current piece. It's about process. This is not just limited to digital works but also to traditionally produced pieces. my work practice involves the re-use and re-working of previous pieces whilst retaining aspects of the earlier work. This can change the context and theoretical framework of a piece, but also creates a timeline of ones work practice.(Respondent-2, 2011)
12. It greatly extends the process of creativity See www.creativity-embodiedmind.com (Respondent-7, 2011)
13. I think the intervention of the personal mark, or personality, or ideas of the individual artist, stop the digital image being bland. Photo-shopped images and students using filters excessively are dull. For me there has to be some quality outside of the digital that makes it of interest. I think (my) recent pieces titled 'Citizens' – 'Ghosts' and "Wild Flowers' which reflected on

mortality personal histories collectively, would have been impossible to render without digital technology. (Respondent-9, 2011)

14. This could also be a code for “dithering” – a refusal to commit. I like working with media where there is an element of risk-taking (often resulting in accidental blots, over-etching a plate, etc.) and the problem solving that might be necessary. This results in a “dialogue” between the artist and the process, almost a battle in some cases. Digital technology allows for endless revision – how many versions of the same image do we want? (Respondent-5, 2011)
15. The implications are to raise the bar for a standard of excellence and expression, since every possible artistic decision is now infinitely available within this medium! The artist even has to decide whether the image or work will exist in a single, final, “best” iteration, or whether its point is better made in versions or transformations. This is exciting new territory. I use all these techniques, and feel that digital work is very challenging, but it offers powerful new expressions. (Respondent-12, 2011)

2.3 Beyond signature.

1. I believe it is an important issue, particularly in terms of tracking our research, citations and authorship. It is an area I am looking into for my own research. e.g. digital watermarking (Gates-Stuart, 2011)
2. I see it is an issue. If I produce a print on water-paper I can easily sign and number on a white rim at the bottom of the image (like traditional prints). But I like to print on a foil that can be mounted on aluminium. This does not look so good with a white rim. I have used a digital scan of my signature and included it in the image, for the look of it. Then I sign the aluminium on the back. I think digital watermarking sounds like a good solution. Maybe it might be easier to sell prints, it might give a sense of exclusiveness, I do not know. Many people seem to be concerned with what they buy is exclusive, “a limited signed edition” has a good ring to it. (Respondent-3, 2011)
3. Only a work originated, signed and numbered by the artist can be said to have value. Perhaps the mass exposure of a work by digital means is no worse or better than the presently accepted principle of mass-printing unsigned reproductions of works of Art.
Traditional and commercial values were recently upheld in USA with the

verdicts imposed on the behaviour of Richard Prince and Gagosian.(Respondent-10, 2011)

4. I will watermark my work on my website but I don't really like the idea of a digital signature. I hate signing my work, I would rather not have to.(Respondent-8, 2011)
5. It's very tricky, indeed... I manage it by manipulating, physically, the printed object, but this seems a poor last shot. ...but the digital watermark looks so cheesy still, to me. Perhaps something embedded in the code of the image file, but that would also require that the viewer/taker of the image could also readily access that code. as material and shipping costs have gone up, and the desire for broader audiences has increased, I find myself looking to the digital image remaining on screen more and more. I still love the tactile object, but some day screens will be able to change their surface/be tactile as well, I'm sure... resurgence of smell-o-vision!(Respondent-13, 2011)
6. This will always be an issue when dealing with digital technologies. I do like to be acknowledged for my work, but I'd rather have it seen without it being recognized as mine, than to never be seen at all. I think in the future it may be some form of original file encoding how about a ".murphy" file type. Of course you'll need a viewer of some sort. Perhaps we will treat images like Apple treats songs on iTunes.(Respondent-16, 2011)
7. Not sure it's necessary since there's a label that can accompany the work. It seems to be distracting in a digital work - Maybe the info could be embedded in the file info?(Respondent-17, 2011)
8. Perfection is the signature of the computer.(Respondent-17, 2011)
9. People are reassured by the presence of a signature implying the presence and approval of the artist. It seems necessary and will probably prevail. I am happy with this provided it is discrete and doesn't detract from the visual quality of the work. – ... (F)or digitally published work Digital files can be tagged as being 'created by..' etc.(Respondent-6, 2011)
10. I don't think about it ... but galleries like the work to be signed and given an edition number. In reality, the collectors who go for this are few in number, intelligent and motivated, so they know what they are getting. In practice, the 'editions' I have produced are usually between five and twenty. Occasionally I have sold out.(Respondent-11, 2011)
11. Nothing is original and digital signatures are useless. If someone wants to use your image, they will find some way to use it. Which leaves only litigation. But it's not about the use of someone else's image, it's about how that image is put to use. That is the difference between copyright

infringement and appropriation, which is a legitimate contemporary arts practice. The reworking of an image and the placing of that image into a different context equates to re-ownership of said image and the creation of a newly copyrighted image. I have no problems with another artist taking one of my images and re-owning it, but I would have a problems with someone using one of my images to print on beer coasters. - It won't stop anyone stealing your image, so there is no need to sign. As I produce traditional prints from digital images, I see no implications for my practice. I produce unique edition prints through multiple layering that, I believe, would be nigh on impossible to replicate fraudulently. (Respondent-2, 2011)

12. YES, but they can be cumbersome, and not fail safe, without interfering with the integrity of the print. You have to establish a trusting working relationship, e.g with a gallery/agency (Respondent-7, 2011)
13. It's a strange thing but originality will always located through time. I think (new forms of signature) is a strong possibility, the watermark or something common form or marking would be a temporary safe guard, but Photoshop can circumnavigate this easily enough. Low resolution a possibility? It seems that art in this media will go the way of music and the pirate bay sites. I don't envisage a sustainable living for artists. Or me anyway. (Respondent-9, 2011)
14. Concepts of the "original" and originality may have more to do with the commercialisation of art. The "signature" ensures the monetary value of a piece of work. I've noticed that for some reason Neolithic cave paintings are generally unsigned. (Respondent-5, 2011)
15. Digital prints can always be limited, signed, and numbered by the artist and files destroyed. This is a practice that requires much self-discipline and is not as often practised for digital works as for traditional ones. Print-on-demand is something new. Accepted practice for traditional prints took a long time to settle in, as will these new methods. Files are a different story as access is more difficult to control, but they can be digitally marked or have a signature embedded. I think we need to establish accepted practices, and then teach them. For now, I am holding to limited editions of digital prints, and avoiding print-on-demand practices. If there were a secure and permanent way to "sign" downloaded prints or files it would change my approach. In the US, we have an automatic copyright when certain information is included. (Respondent-12, 2011)

Modes of consumption.

3.1 Curating the digital.

1. I am currently working on a project called mediaesaurus – it is at an early stage. Please see:
http://www.mediaesaurus.com.au/index.php?option=com_content&view=article&id=17&Itemid=22 I was part of a collaborative partnership 'gatescherrywolmark' – exploring authorship and identity using digital methods.<http://www.eleanorgatestuart.com.au/egs/gatescherrywolmark/gatescherrywolmark.html> I am developing my mediaesaurus site as a space for collaboration (Respondent-1, 2011)
2. I have only participated in festivals and exhibitions, where I sent digital images/ films. For me it was successful, I showcased my work. I use digital methods as much as possible.(Respondent-3, 2011)
3. Yes – (used) GPS online archive to prepare a workshop... being able to access the archive online is a fantastic resource.(Respondent-8, 2011)
4. Yes - a print exchange and sale at the University of Kentucky. - We sold out.(Respondent-13, 2011)
5. Yes - These were all Internet based exhibitions.(Respondent-16, 2011)
6. Slideroom seems to be common these days for digital submissions of artwork. - Great, a lot easier to sending a CD, you can upload instantly.(Respondent-17, 2011)
7. Organizations like CAFÉ for submitting and jurying images. - It's much easier to submit and jury from digital files. (Respondent-15, 2011)
8. I've sent many applications which have been curated from digital submissions. - I've also created a large format digital print which was partly proofed via digitally exchanged files. - For the applications, works were selected from emailed digital images. For the print, files were edited and transformed, proofs were created while I was on site. Minor modifications were made later and files transferred before posting out a subsequent proof. - Both were useful and practical ways of working.(Respondent-6, 2011)
9. If you mean exhibitions etc. which were of digital art, or were put together through internet communication etc.... yes, many times, e.g. I have shown 8 times at SIGGRAPH since 1995, and also at ISEA, Eurographics, Digital Salon, etc..... V and A... etc. (on success of events) By what criteria? I sold work at SIGGRAPH regularly, but not so much at other festivals. But digital shows were often poorly lit, poorly installed, and up for only a few days, and never impinged much on mainstream art. My feeling is the epoch of the

digital art show – when the technology was fresh and used with the enthusiasm of the innovator – has passed. (Respondent-11, 2011)

10. Yes. I am represented by Vegasspray online gallery in Brisbane Australia and have taken part in online exhibitions with them. And Born Digital. (using) Social network dissemination of info and use of these networks to post invites to view. Each artist has a gallery with a selection of their best work as well as an info page. – very successful. (Respondent-2, 2011)
11. Yes - Digital prints/sculptures, videos, power point presentations, interactive installations. Very (successful) (Respondent-7, 2011)
12. Yes - Digital printing for a collaboration with Polish artists, exhibited in Tallinn. Titled, "Book of evidence" - From the point of dialogue with other artists it was fascinating to see the different approaches, where the Irish contingent tended to work as individual's, the Polish came up with a shared format and collective concept. The medium provides a very user friendly interface via computer, the printing methods are largely consistent from city to city, as are costs. So one is able to curate with a good idea of what can be achieved and produced. No surprises arriving in the crate. Because of the consistency in display and production, It also means more ambitious projects can be readily taken on board, further afield. Artistic exchanges or exhibitions, or books. (Respondent-9, 2011)
13. No. (Respondent-5, 2011)
14. Yes. (using) Skype, internet file posting, email, paypal for expenses, U.S. Mail, etc. I recently made a collaborative digital print with an artist in Iceland (Valgerdur Hauksdottir) where neither of us left our studios (I am in Boston) - using Skype, large files posted on Internet sites, and mailed tactile proofs. It was rewarding and resulted in work we both felt was successful. We produced it as a limited edition for a project curated by April Katz in Iowa. The prints were shown at international and US venues, and collected. The Skype exchange was particularly informative. I think a project utilizing simultaneous geological or meteorological images from around the globe would be an interesting conceptual approach, then using Skype and internet for image development. I also have done a traditional print international portfolio with 10 artists where all the administration was by electronic means. (Respondent-12, 2011)

3.2 Networked collaborations – the digital atelier

1. I have never been in networked collaborations I work solo. But I am on Facebook, and find out about exhibition opportunities via the net.(Respondent-3, 2011)
2. I have my work on facebook but I am yet to network with it. (Respondent-8, 2011)
3. I collaborated with some artists in Australia, Brazil, and Cuba after a conference in Cuba a number of years back, also with some faculty and advanced students at Woodbury College in Los Angeles and here at UNC Charlotte, and I've collaborated with my partner.(Respondent-13, 2011)
4. Yes. Lately I have been using the Siggraph Digital Arts Community website (DAC). (Mostly for) Information exchange mostly but it has led to a few collaborations.(Respondent-16, 2011)
5. Some, mostly for connecting with people or information. Mostly info exchange (and) research about safer non-toxic practices in the studio and troubleshooting printing issues with newer technologies.(Respondent-17, 2011)
6. I use Inkteraction. (for) - Information exchange. Made new contacts, continued existing contacts. Made aware of common global printmaking concerns and new developments.(Respondent-6, 2011)
7. Just use social networking like everyone else. Not a printmaking specialist though.(Respondent-11, 2011)
8. A small amount. (For) the sourcing of other artists to collaborate with through the viewing of their portfolios online - I generally find that the main benefit is the ability for others to view your work online from wherever in the world they are, which leads to invitations to submit to prizes and exhibitions that you previously wouldn't have had access to, and the potential to work collaboratively with artists that you would normally have no exposure to as well as the ability to exchange ideas with artists from different arts of the world, who work in the same context as yourself.(Respondent-2, 2011)
9. Not yet (Respondent-7, 2011)
10. I am on both the above mentioned (Inkteraction Print Universe), and set up an Irish version. 'INKSPOT" Unfortunately it doesn't have the wide membership of those above to drive it forward, and relied solely on me pushing it along, with little posted by its 80 or so members. It takes up a lot of time I can't readily give. So I closed it, but on reflection I may resurrect it sometime soon, once time permits. They raise opportunities, it's a welcome

aid for exchanging opinion, getting help on developments, of ethical issues. Seeing artists works in divergent countries. I readily support this kind of initiative. This exhibition is typical of what can be achieved it is one of three or four opportunities that have happened to me from such networks.

(Respondent-9, 2011)

11. Involved a little – I have personal pages on two sites, have contributed to print forums, etc. Have taken part in technical forums and have been involved in a couple of exchange portfolios. Have taken part in technical forums and have been involved in a couple of exchange portfolios.(Respondent-5, 2011)
12. Somewhat (involved in printmakers networks) Information exchange, exhibiting images, website distribution. Collaborative works happen through a more personal type of connection. advantages have included broad distribution of information such as the Boston Printmakers Biennial Exhibition.(Respondent-12, 2011)

3.3 The on-line marketplace.

1. None, so far. However, I am considering using a site in Norway for artists and craftsmen to sell their work.(Respondent-3, 2011)
2. Only my website and the SIGGRAPH Ning. Digital prints are still harder to sell than traditional prints and I teach to make ends meet. When I do sell a work, I usually end up donating the profits to charity.(Respondent-13, 2011)
3. I haven't sold my work online but I hope my website promotes my work.(Respondent-16, 2011)
4. No.(Respondent-15, 2011)
5. No but - Etsy perhaps suits more craft/design- based work.(Respondent-6, 2011)
6. Some years back, but only sold a few, and the packaging, and admin was quite a bind.(Respondent-11, 2011)
7. No.(Respondent-5, 2011)
8. Not very much. I do promote my work through my website and printmaker network listings. Minimal (involvement with Etsy etc.), as my work does not report well through low-resolution reproduction. I do list my work with the American Print alliance. (Respondent-12, 2011)

The philosophical context of the digitally mediated art object

4.1 "Aura".

1. Distinction = Traditional – Prints made using a press as in an etching press, screen bed, by hand (rubblings), etc Digital – screen, inkjet, projection, installation, etc. (Gates-Stuart, 2011)
2. It is just two different technologies. It is not the technology but the artist, and what he/she wants to express. (Respondent-3, 2011)
3. Traditional printmaking has Drawing and Painting values to the fore whilst the Digital printmaking so far has an insatiable appetite for Photography based imagery. This is a new form which may be 'hiding' its aura from us. (Respondent-10, 2011)
4. The interface: screen and printer vs. block and press. But that's it. I think he (Benjamin) might have been confusing "aura" with craft and tactility. Craft has been improving over the years as artists are gaining skill in the new media. And tactility is tricky. When you do a screen print, you can see and feel the layer of ink on the paper. With inkjet prints, however, the ink sinks into the paper and/or primer, leaving a surface that is utterly smooth to the eye and fingers. For instance, we still have a hard time viewing video and web-based works as "art" for the same reason, although this is much less so since more audiences are well versed with time and screen-based media now. (Respondent-13, 2011)
5. I think people regard traditional form of printmaking as more pure and "true" and therefore regard digital forms of printmaking as less important. I never believed in this idea of "aura." Benjamin was from a different time when these ideas of reproduction were less integrated into the fabric of culture. I hope that one of the positives of digital media is that we have revised this notion of "aura" and perhaps tossed it aside altogether. As I previously mentioned, digital prints also may have a much shorter lifespan in that the work is mutable. So an image that exists may be revised, modified, reworked. This new print "trajectory" is a pretty fascinating thing really. It makes the work more like a living being in that it can transform over its lifetime, leaving different states of being. Of course, most artists probably work on an image, and then say "I'm done" and never revisit the work, and that's fine too. (Respondent-16, 2011)
6. ...they are blended in so many ways and before digital technologies it was still possible to use transfer and photobased methods. Digital only made image processing a little easier. I suppose there is a step of translation that

happens by hand inking something as opposed to digitally printing it. The image may get more crude. Mostly traditional ink on paper is different from computer ink and the computer can do everything in one layer and have wider variation in one colour that you get by hand you would have to print many layers to achieve the same result and each layer is affected by the one under it. You don't get this in digital printing unless I suppose you run the paper through several times. Walter Benjamin describes the loss of the "hand" but the hand can work in different ways in the computer, it's just another tool that artists use. (Respondent-17, 2011)

7. Technologically "reproduced" artwork is a reproduction. - A flat, digital print is of little interest to me. It is the combination of digital and hand work that I am interested in. - Good work is good work. (Respondent-15, 2011)
8. There is a different ink and surface quality. This alludes to the difference in skills required in both methods of creation, and involvement in creating the work. Each method offers the artist different possibilities with some things being arrived at more easily or satisfyingly with either approach. (on loss of aura) I don't think its possible to be as general as that. Some styles of work may seem more fitting and benefit from the smooth, perfect aesthetic of digital print. Others may benefit more from the rougher, low tech sensibility of the traditional print. Both can have their 'aura' when the right method matches the aesthetic in conveying the artists sensibility. Our notion of value and worth is subject to change and is informed both by our taste (which is effected by fashion and the sensibility of the time) and by our background knowledge (which also affects out taste). well conceived and created digital works can have a character of sophistication. For me it's about choosing the right method to get the desire feel of the end-result. (Respondent-6, 2011)
9. Well, again, that's a whole book... on the other hand, it is all to do with convenience, lack of smells, speed etc. I haven't produced a proper 'wet' print for over 40 years, and have no intention of going back to such a roundabout way of making an image. Should be 'its' here. Always thought Benjamin was wrong on this. No case to answer. How many portraits of Luther are there by Cranach..? An awful lot (just seen even more at the Paris show). I don't think his opinions on art suggest he had much knowledge or passion for it. There were loads of copies, prints, etc in circulation way before 'mechanical' repros. (on aura) It's just wrong. Or don't understand what this aura is supposed to be... and probably wouldn't like it if I picked it up. My favourite print in last year's Academy Print show

was the Toulouse-Lautrec on paper like newsprint.. ie a throwaway poster. I really dislike etchings that are all about being etchings. This has more to do with snobbery than with visual expertise.(Respondent-11, 2011)

10. No distinctions. - Technologically reproduced artwork means just that. An artwork i.e. painting, that has been reproduced through technological means eg. Offset printing with four colour process. A reproduction! Whereas a work produced digitally may only have its monetary value diminished due to the limitless number of originals that can be produced. If you produce only a limited number of hard copies then the connoisseurship remains, and with purely digital images (that remain within the digital world), if you only produce a limited number of files which have a copy protection script written in, then it is entirely possible for those to retain a certain "aura".

(Respondent-2, 2011)

11. A lot of traditional printmaking can have a more '3D' surface than 'mainline' 2D digital prints (the loss of aura) can be a distinct possibility. However, the digitally mediated surface does offer opportunities not realisable by other methods. Yes (consideration of aura affects my practice)(Respondent-7, 2011)

12. None for me, all print related including photography. I don't share this assessment by Benjamin. The creative thought is the genesis of art, not its production method. Technique and labour doesn't always lead to decent art. Laser cutting machines can mimic woodcuts and etchings. In the same vein as Screen printers can through true grain mimic litho qualities, from my point of view its what you do with the machinery, the technique and mark and the image that's important. Aura or uniqueness? That's another print dilemma?(Respondent-9, 2011)

13. It is to do with materiality and the process of making. "Traditional" print media use physical materials and an additive process of layering ink films or subtractive techniques of scraping and burnishing an etching plate, for example. These lend certain visual and tactile material qualities to the print. So far similar techniques using digital technology can only approximate the above. The key word is "reproduction" – if a work is reproduced it must lose an aura of "originality". The production of "original" multiples may be different. A work of art might only have an "aura" created by the myth surrounding the "genius" of the originator. (Respondent-5, 2011)

14. They are not that different, as printed forms. Both forms are remotely produced, reproducible, and both are technically demanding. I am interested in the object – thus I spend as much time (or more) proofing and printing a

digital print to my satisfaction than I do a traditional one. Both are very rich surfaces. Some of my digital prints have been mistaken even by printmakers for traditional ones. The main difference comes in that the digital print is also a digital file, and as such has an extended life that the tactile print does not have. A lot of time has passed since Walter Benjamin's observations, and the art world is very different now; many respected galleries here show only technologically produced art work and that creates its own aura; almost everything is digitally mediated, even painting. Such images almost everywhere now. My practice has entered many non-art settings and platforms – supercomputing studios, gaming devices, streamed presentations, etc. I am used to not depending on the aura of art for an effect. Much of my work can't even be collected so connoisseurship seems remote. (Respondent-12, 2011)

4.2 Digital Medium & Simulacrum.

1. I think there are possible a few models to be developed. I think it will affect my practise – working on this currently. (Gates-Stuart, 2011)
2. I question how can I get paid for what I do. Maybe selling prints is not the way to make an income. One has to find other ways. Can a system be made so artists get paid for their work if it is downloaded from the internet? What shall it cost? I think one has to see how the music industry is organized. How can one connect artists digital productions with all the electronic screens in public space? (Respondent-3, 2011)
3. This is either a commercial contract to replicate the copyrighted image, or it is theft. Inevitably monitoring such a situation would be as difficult as protecting music, but issues of copyright and royalties in the music sector are ongoing. (Respondent-10, 2011)
4. In technical performance, the characteristics of digital print production are cheap and the printing form to a relatively small print speed (Respondent-4, 2011)
5. that's both the advantage and disadvantage for connoisseurship. (Respondent-13, 2011)
6. Reproduction allows an image to really be disseminated within our culture. It gives the image more power. This is a good thing - it makes me search for ways my images can be reproduced and disseminated on a large scale. (Respondent-16, 2011)

7. Yes, the matrix (digital code) can not get worn down like it would in a traditional process. This means you could have the exact same result every time. It's fascinating. Of course due to difference in printers it will never be printed exactly the same. Perfection is the signature of the computer.(Respondent-17, 2011)
8. A reproduction of work done originally in any other medium is a reproduction, not an original work of art. I deal with unique pieces or limited editions which are rarely printed straight from the computer.(Respondent-15, 2011)
9. The notion of limited-edition print is an affection to heighten value when applied to digital print. It seems strange to slavishly adopt the editioning conventions associated with traditional print when digital print offers the artist other possibilities such as print on demand, the possibility of producing the same work at different scales. Buyers prefer to know if the print is limited in edition so the edition number prevails. I have produced some digital editions as print on-demand editions. It is important for the artist to keep a record of the numbers printed and signed.(Respondent-6, 2011)
10. I use my own large format printer for proofing, and the LPS for larger scale prints, and the cost of a large run is prohibitive... though much less than it was... Iris prints of about 22" x 30" cost £250 15 years ago I recall... and that is for one...and were of inferior quality (in terms of colour gamut) to what we have today from Epson, HP etc). Only someone who wasn't into this stuff would say that... a theorist perhaps... . I just do paintings, drawings etc and mess around. Also, this has been my natural way of working for over 20 years... so can't imagine going back to a non-digital labour-intensive method. (Respondent-11, 2011)
11. As with digital music, all copies are originals. This only reduces their monetary value per unit. Mass produced cheap artwork for the contemporary consumerist society. It won't at all (affect my approach to practice).(Respondent-2, 2011)
12. It would be really boring to keep producing minor variations on the same thing.(Respondent-7, 2011)
13. Multiplicity is one of the elements of printmaking that I admire; its democratic nature is part of my practice and one facet I look to exploit.(Respondent-9, 2011)
14. No reason why this should be a bad thing but (rightly or wrongly) what value will we place on the resulting images? (Respondent-5, 2011)

15. The main issue is of value and limitation, distribution/communication versus selectivity/elitism. Many artists disagree on the role of the fine art print in culture, which is also now a changing role. And whether the digital print is or should be a fine art print. There needs to be room for distinction in process, since artistic purpose and philosophical position vary so much in our field. The idea of the distributed print is historically still very strong despite the art market's limitations. It affects it (my work) now. For my digital prints, I produce limited signed editions. I do this to sustain the existing expectations for my prints, since most of my early prints were limited editions. I have no philosophical or aesthetic reason to change this practice, even though I realize I could. (Changes in scale are included in this. My work has its optimum form when I print it.) (Respondent-12, 2011)

4.3 Materiality & permanence.

1. I am not sure if the criticism is receding as there is a lot of printed material in the market. It raises a lot of questions about professional standards and quality. (Gates-Stuart, 2011)
2. They are probably still valid. Maybe one has to think re-make. You do not only buy a print, but maybe a license to a print. So, if the print diminishes in say- 10 years, or whatever – then the buyer is entitled to a re-print. (Respondent-3, 2011)
3. Receding slowly, but not certain to disappear. Ink life of 75 years cannot easily be shown. (Respondent-10, 2011)
4. I (am) a little sceptical about how “archival” some inks really are, and time will tell. But I tell folks who buy my work that if they have any troubles with the image degrading, to just give me back the image and I’ll reprint it free of charge. Hasn’t happened yet, but it seems a fair way of dealing with it for the time being. (Respondent-13, 2011)
5. Ink and paper has evolved so much over the past 20 years that I don’t think permanence is much of an issue. (Respondent-16, 2011)
6. They are not still valid, it is now possible to achieve similar permanence for a work of art digital printed. (Respondent-17, 2011)
7. They are no longer valid. (Respondent-15, 2011)
8. It appears that permanence issues have been resolved and that this is no longer a valid criticism. This, as with all inks, is based on trust. Time will tell. (Respondent-6, 2011)

9. I have inkjet prints I produced on my Xerox 4020 inkjet printer in 1988... and on thermal printers before that, and these have not faded, as far as I can see. At the time the alleged impermanence, and the thin paper used, were regularly cited as the reason this was not a valid print medium... along with the apparent lack of human touch. My gallery at the time, the Todd Gallery, did show one or two, but were reluctant. The V and A, however, was more enthusiastic, and purchased a set in 1990. This criticism came from printmakers, art schools, and galleries marketing 'fine art' prints. So I think they all had a vested interest in discrediting this fabulous new medium. But.. I am not a printmaker... and have my own bias. There is a more relevant question, and that is the quality as art of early 'computer prints' as art – answer: variable. And also, what is the quality as art of the works of self-declared 'fine art' printmakers. Again, variable. Is one group better than the other? More inventive? When I am excited by a 'print' I see in an exhibition, I don't give much thought to the actual medium. If it's a Picasso, which it often is, well, I don't think of him as primarily a printmaker – though of course he took a lot of trouble over it.(Respondent-11, 2011)
10. I think they are no longer valid at all, with new inks quoting stabilities of over 300 years and the availability of archival art papers for digital printing, it is no different to any other medium.(Respondent-2, 2011)
11. Digital prints are at least as good as water colours(Respondent-7, 2011)
12. I think they are still valid to the collector, if permanence is only estimated currently to around 70 years with archival ink. Technicians seem not to be able to give a precise number of years yet.(Respondent-9, 2011)
13. Technology will surely find a way to ensure the permanence of an image or conservators will find a way to preserve it, particularly if there is a sound historical or commercial reason for doing so. (Respondent-5, 2011)
14. Receding, though residually problematic as continuing stereotypes. It might be a good idea to promote a distinction between fine art digital prints and push-button color printing. A new term perhaps?(Respondent-12, 2011)

4.4 Instantiation and temporal form.

1. Re Print on demand - Brilliant – makes sense.(Gates-Stuart, 2011)
2. In a purely practical sense this is welcome, but it does pose difficulties if a printer, operator, or matching paper and inks are no longer available to complete a full edition years later.(Respondent-10, 2011)

3. I do this quite a lot. I only print works as I need them to save on resources and materials. If a particular image is a “dud”, then I haven’t wasted any resources beyond whatever powers my CPU.(Respondent-13, 2011)
4. It’s possible and already utilized on websites such as DeviantArt. I would think it produces an inferior product when printed by the buyer as they often have no understanding of printmaking, papers, color-balancing, etc. Honestly, I keep many of my digital prints in a virtual state until I either need to sell them or exhibit them in a gallery. My new series of work, Dig, even started out digitally, as 360 degree panoramas. They then became prints on cloth. Sure something is lost/gained in the translation. It’s a different experience looking at a screen and handling an object. I teach at a university in North Carolina. As my students print their work from the computer, the highly recurring observation is “It looks different on the screen.” Yes, it does.(Respondent-16, 2011)
5. I have works that go unseen that I pick up again and decide to print even though it was created years ago. I suddenly recognize a value in them that I hadn’t noticed before.(Respondent-17, 2011)
6. My images are more complex and can’t be printed by someone else. However I do have books which can be printed on demand.(Respondent-15, 2011)
7. Allowing the purchaser to download and print the image themselves removes a large element of quality control from the artist. I would be very wary of using this myself. If the purchaser orders a print from the artist (print on demand)then this offers the benefit of opening up flexibility for artists wishing to create larger bodies of work and then print-on-demand.(Respondent-6, 2011)
8. I don’t understand ‘virtual’. I know people used to imagine the print-on-demand gallery – Wolfgang Lieser started out with this with the DAM project in Wiesbaden in 1998 – but it never worked out.(Respondent-11, 2011)
9. Mass produced cheap artwork for the contemporary consumerist society. It won’t have any affect on my practice.(Respondent-2, 2011)
10. That’s what I do. But I keep to a limited number, and keep a record of this.(Respondent-7, 2011)
11. Its entirely possible, I immediately think of the carousel digital photo frame, I can see art entering the home on a large scale monitor and performing a similar service. Complete with precise colour matching, and 3 d brush effects. The experience of the virtual will be offset against the impossibility

of ownership. A van Gogh in your living room will become a possibility, replacing the Tretchikoff of the 1960s. (Respondent-9, 2011)

12. I choose to print limited editions of my digital work, all at once. Not all digital prints are created equal, and the results and settings of various printers fluctuate wildly. I am very particular as to color/surface/paper/nuance. It takes me as long to proof and produce a digital edition as a traditional one. The lack of control of print-on-demand is not something that interests me. I have experimented with such projects and have been discouraged at the results. That digital printing is consistent and automatic is a huge misconception. - Printers change with time. Even print-on-demand from me would prove problematic – I may not be able to produce a consistent result over time. (Respondent-12, 2011)

4.5 Authenticity.

1. Important - tracking work, tagging for citation, research evidence, ownership Hopefully my artistic identity in terms of a lengthy investigation to my image making and personality in the work. In practical terms, an embedded signature file would be ideal. (Gates-Stuart, 2011)
2. The question of numbering and durability is relevant if I wish to sell to a "serious" art-market. Traditional collectors of art, who are interested in prints as an investment, might question these things and are perhaps significant for setting a price-tag for the print. (Perhaps it is the role of marketing that is most significant, not the question of numbering or durability. (Respondent-3, 2011)
3. The content of the work is authentic, made by the artist. The media in which it is presented is just that, presentation. That I the artist had created the digital image and agreed to it being printed. (Respondent-3, 2011)
4. Works signed and numbered by the originating artist... or signatures by two or more contributing artists. (Respondent-10, 2011)
5. Authenticity, re-appropriation, copyright, ownership. You do what you want and hope not to get sued. (Respondent-8, 2011)
6. I think authenticity is actually gradually getting more and more connected to copyright issues in a weird way. Even when it's forbidden, it's very difficult more my students to not surf the web to appropriate materials for digital collage. In and of itself, I don't have a problem with this, honestly, but I think this practice has engendered a creative and intellectual laziness that is

becoming a bit of a cultural plague. I now set aside a project where students may only appropriate public domain works (and they must document it) in part to teach about copyright law, but it part so that they understand that historical images have a unique and unshakable context. Also, forcing them to otherwise create their own imagery teaches them about the uncertain feeling that happens when one is creating something radically new.... A discomfort that's to be sought and cherished!
(Respondent-13, 2011)

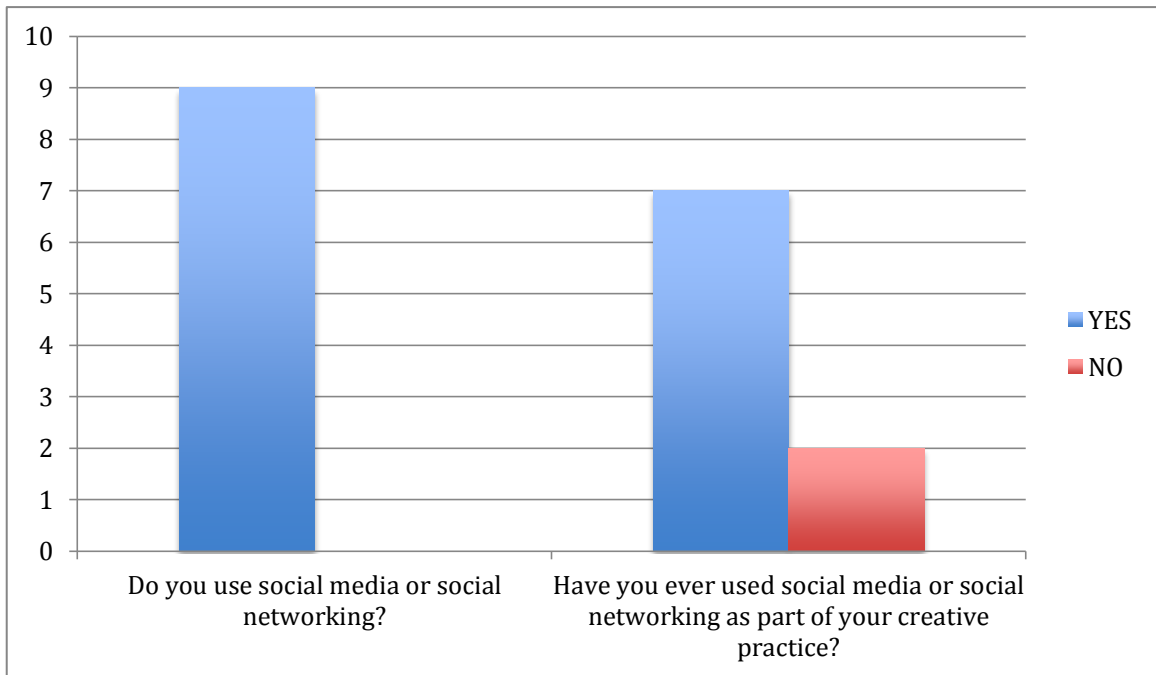
7. I'm highly sceptic of this idea of authenticity. Perhaps it seems to dated. Things change. The world is dynamic. Authenticity is perhaps just a complex revision of static and pure. I don't strive for authenticity. I look for meaning.(Respondent-16, 2011)
8. I think it's us who needs to change our thinking about that. I make digital prints and they are authentic 😊 (Respondent-17, 2011)
9. If the artist puts their name to the work, either by physically or digitally signing then it is authentication of being the artists work. I don't use authentic in this instance to differentiate between a creative or reproductive use of print, which is as open to interpretation or misuse with artists using photo-mechanical printmaking. Their (digital prints) creation is inherent in the digital process, i.e. they are digitally-born. I also prefer to sign the print.(Respondent-6, 2011)
10. I don't think about it. My interest is on the quality of visuals. What does authentic mean? Don't really get this. My interest is in the design, the colour, the way the image works, etc, etc... and if someone says it is 'inauthentic' because of the way it is made, well that is their business. I might prefer it to be or look inauthentic. I get a kick out of making a painting look printed.(Respondent-11, 2011)
11. I think that authenticity is a word that shouldn't be use in the digital context. Copy/original, all copies are original and all originals copies, clones, authentic. To easily reproduced and calls into question authorship not authenticity. Just the fact that they exist (makes them authentic).(Respondent-2, 2011)
12. There are lots of influences on a work I have to feel I have made a significant input.(Respondent-7, 2011)
13. Authenticity is the act of concept, whether the artist has any hand in the making or the finishing of the piece doesn't matter. The fetishistic nature of print makers and their material and technical procedure, are at odds with

this. (Authenticity is achieved by) The concept of the narrative, and the arrangement of form. (Respondent-9, 2011)

14. A fixation with such terms as "authenticity" and "originality" may detract us from issues that should concern us as artists. We should perhaps be less "elite" and introspective and inward looking and direct our attention to the real issues that concern mankind and its future. (Respondent-5, 2011)
15. Authenticity indicates a close link to the originator. Conversely as regards broad distribution, an artist's ability to standardize an image for such distribution. Mine are authentic because I sign them. (Respondent-12, 2011)

APPENDIX IId Survey results from Exposition Seminar & Discussion Group

1. Some questions about social media and social networking:



2. Now about social media and social networking and your creative practice:

If you have used it as part of your creative practice please describe how –

1. Website
2. Used a charity page to make people aware of my project asking their opinions – charity head shave - my project deals with body image
3. No Response
4. As a printmaker we are currently holding / organising an exhibition which has been advertised on Facebook etc. as a "bring your own art" project and within /after the exhibition I intend to give parts of my art away and have the receivers "hash-tag" me on twitter instagram etc. and then have them create works similar extending the project and hopefully creating a "trend" inspiring others to carry on my initial ideas/project and watch it adapt through others interpretation – all

documented within social networking.

5. To get together artists for exhibitions & to gain research from people about my topic by putting out forms / questionnaires
6. At the moment we are having an exhibition and using social media to get word around and people involved
7. To publicise / promote it
8. Comparing ideas and talking about artists
9. To show / promote work on website

If you have not used it as part of your practice please describe any creative potential you might see for it your own practice.

1. I may use social networking in my own practice by publishing images of my work on the web in order to gain feedback
2. No Response
3. I really like the idea of producing a work and it then having people digitally alter it so it can become a global work
4. No Response
5. No Response
6. No Response
7. No Response
8. No Response
9. No Response

3. What do you think are the effects of working digitally ***(For example - using projections, making digital inkjet prints, multimedia, producing digital screen-print separations, using digital photography, appropriating images from the internet etc.) are on:***

The permanence of work a printmaker might create?

1. I do not believe working digitally necessarily detracts from the permanence of the work. It is a different way of working which some people appreciate and some people will not
2. No Response

3. It's not something that will likely become part of my regular work as I love the beauty of paper and the feel there is something lost in the process if its not done by hand.
4. I think that printmaking will adapt through the digital age, and it is giving printmakers a different avenue to go down- if we choose; it's a permanent as any art adapting through the years
5. The printmakers work could be accessed forever if digital, unlike physical prints could be destroyed, lost or damaged
6. I think there are positives and negatives. I am not too confident in creating digital work but it does appeal and I think it's the next stage in the digital world.
7. The value of the physical print compared to the reproducibility of digital.
8. Will produce changes – depends on printmaker.
9. Becomes available to everyone – not – an original-lost its value.

The physical or material nature of the work? (For example is an archival inkjet on 300gsm acid free digital Somerset just as valid as a screen print on a similar non-digital paper)

1. I think they can be as valid but only in the sense of a completed composition. I still prefer the traditional methods of creating prints because of the methods in which textures can be made.
2. I feel they should have the same importance but some people think digital is less worthy.
3. I think it depends on the work because if it is something that can be cpy and pasted how can it be art?
4. No Response
5. No Response
6. I think it's valid but it's not using the traditional practice which I feel is highly important.
7. No Response

8. yes again though it depends on how the printer wants the works to last.
9. No Response

Do you use digital methods in your own work?

1. Yes I use digital methods for working on photographic imagery but not printmaking.
2. Yes
3. Photo-etch and screen-print but always in conjunction with hand drawn layers.
4. Yes photography, Internet, a small amount of Photoshop – of what I can understand.
5. I use Photoshop to layer my drawing up – to collage. Its basic skills I have in digital methods.
6. I am planning to this year, but my lack of confidence using it hinders my ability to create a piece that does the technology justice.
7. Yes heavily but we are beginning to try and use more handcraft (turning away from the digital)
8. Yes
9. Adobe Photoshop to produce work

The authenticity of the work? (For example how might you know a virtual print was by a particular artist e.g. David Hockney's iPad "Fresh Flowers" series.)

1. I would expect them to have signed the print. My interpretation of the value of the print is that a digital print cannot have an equivalent or greater value than a traditional print
2. Yes digital does pose a copyright problem
3. You couldn't, but that might be something that left as unknown.
4. Due to it being easier to distribute work and possibly create work quicker, the authenticity could become easier to realise due to more work getting out to more people, so the artist's name could travel more and the digital print could become more known than a paper print, stuck in one place.
5. No Response
6. I don't think there is a definitive way of knowing. The Internet is full of art pieces, how do we know something belongs to someone.
7. Digital should be expected to be shared.
8. Brings in questions depends on the printer.
9. You don't know unless it is stated.

Authorising others to use the work? (For example, when you edition your prints do you treat the digital images etc., in the same way as you would your normal editions, do you limit them or not?)

1. I have not treated my digital images as limited editions so far. I do tend to feel that digital work is easier to produce than traditional.
2. Yes you would have to treat them the same.
3. Yes as they are more precious if there isn't a ready source of them
4. I do think a digital print may lose it's value – complied to a physical group of editions, due to it being so quickly and easily multiplied.
5. Would be much more difficult to control the amount of editions when its done digitally as things can easily be reproduced.

6. I would limit them – yes. Just because its digital doesn't mean it should be constantly there.
7. No Response
8. Up to the artist.
9. Anyone can see the images on the Internet.

Allocating ownership of the work? (For example how do you know if the person your get work from on-line is allowed to sell or give it to you.)

1. This would be very difficult to prove unless the artist has signed the work to that effect or a contract of some kind can be provided.
2. This is a problem – I really don't know its quite worrying.
3. You cant
4. A lot more difficult to keep your work to your name only – online allows a lot of copy and paste
5. No Response
6. you don't unless you ask.
7. No Response
8. Requires a lot more checking sources.
9. No Response

4. Thinking about working as a creative person:

What benefits might using social media or social networking have? (for example access, exposure over and above gallery models or using eBay / kickstarter)

1. the possibility of networking and spreading the word is very useful. However the fact that everyone is doing this makes it less effective. You are one creator in a sea of creators.
2. Unlimited possibilities.

3. Wider awareness globally of work.
4. Get your work recognised quick and more of your work being shown, shared around the world, gives non experienced artists a chance to sell their work – hint at getting money for art. An online gallery – where not easy to get work into a physical gallery good ☺!
5. You can easily share things (work) with millions of people. So commonly used.
6. There are many advantages, more exposure, introducing work to people who aren't used to the changing ways applicable in the creation of work.
7. No Response
8. making connections.
9. Get a name for yourself, promote your work, sell work.

What disadvantages might their use have?

1. If you control the release of high-resolution imagery nobody can really steal your work but they could be influenced by your work and steal ideas.
2. Lost? Is it art is it personal how do we interact – view artwork?
3. Plagiarism and lack of acknowledgement.
4. So readily available online, what if people just look online instead of going to see the physical piece in a gallery. Artists can not meet the viewer personally and vice versa.
5. As everyone can share their work means there will be more art that isn't "good art". Spam begins.
6. There is more chance of theft of work and using prints without permission.
7. No Response
8. not everyone will use the social technology.
9. It's not a physical painting / object etc.

5. This research seeks to examine the possible boundaries between physical and virtual or post-physical printmaking.

Do you think there are any boundaries between physical print and digital/virtual print? And if so could you please describe them.

1. Traditional prints may involve various techniques required to accomplish a finished product. Decisions on the size of the edition may have to be taken early on. A digital print can be printed indefinitely as long as the technology permits. It should follow that traditional print methods hold a greater value. The digital file could be forgotten for years and years and then (providing the technology was not changed drastically) printed once again. I am not certain this could be said for traditional printing the way that a trad print is brought to a conclusion is more dependent on the artist and the technician making decisions. Once the digital print is stored as a file it is down to computer /printer calculations.
2. No I don't. Unlimited possibilities unlimited boundaries.
3. Yes - there is a growing reliance on digital media – if we continue to go down this path we could lose our roots – I work in monotypes and the reason is its all by hand its all one off and it works or fails there will never be another exactly the same.
4. No Response
5. I think the line between printing and digital is becoming less and less. I personally can appreciate both physical and digitised art its about the work behind the piece I like to understand.
6. Yes – the time and skill between the physical piece of art and the digital. The rawness of physical work. But there are many things that digital work can do that physical cannot. More chance for participation with the work and involvement.
7. No Response
8. Finding how physical & digital can support each other depending on the outcome.
9. Physical print maybe has more value than a digital – you can touch it and see the brush strokes etc. whereas anyone can view it online from anywhere in the world

6. Please use the space below to provide any other observations you would like to provide surrounding the area of digital technologies and the potential (or otherwise) of social networking /media in creative practice

1. I tend to feel uncomfortable with the thought of limited edition digital prints. However if the print has mixed media content of both traditional and digital – I would be content with it. I still prefer traditional prints, as currently digital printing does not have the ability to create tactile prints with a variety of surface treatments.
2. No Response
3. No Response
4. Social networking can be a great way to get people to casually interact with art, which can then build to them understanding art more, getting involved more, and easily finding art which otherwise would be impossible.
5. No Response
6. Things are changing, I think tradition is a dying form, I feel quite intimidated by the use of technology in art.
7. No Response
8. Spending time learning the skills to use the technology.
9. No Response

APPENDIX IIIa Research Design - Map of Research Elements to Interview and Survey Questions

Relating to Research Element: - New Materiality & Signature.

	Target – key personnel in print studios and workshops.
Topoi of Review from Contextual Review	Interview Questions
Post-physical forms.	<p>Electronic Prints</p> <p>Traditionally printed media such as books, magazines and newspapers are increasingly being published in non-physical forms such as internet, kindle and eBooks.</p> <p>What do you think this might mean for printmaking practice within your organisation?</p> <p>What artistic opportunities might these non-physical print forms present for your artists?</p>
Fluid permanence reversible process.	<p>Flexible Processes</p> <p>Digital processes give the print artist the potential to use flexible and changeable processes for example add / remove /shift layers and separations, change colours quickly and edit brushes. In effect the artist has the potential for reversible process and thus permanence in their work can become fluid.</p> <p>Do you see any evidence of this within the practice of artists in this workshop/studio?</p> <p>What do you think the implications of “Fluid permanence / reversible processes” to artistic practice are or could be?</p>
Beyond signature.	<p>Signature</p> <p>Although the production of work through the digital print medium is now well established, issues of originality with respect to signature still exist. What do you think about this?</p> <p>Do you think there is the possibility of using differing forms of signature e.g. digital watermarking</p> <p>Could you suggest any new methods of signature?</p> <p>What might be the implications of this be to this organisation / studio?</p>

Relating to Research Element: - Modes of consumption.

	Target – key personnel in print studios and workshops.
Topoi of Review from Contextual Review	Interview Questions
Curating the digital.	<p>Digital Curating</p> <p>Has your organisation used digital methods in the promotion, curation and facilitation of exhibitions, print exchanges etc?</p> <p>What methods were used?</p> <p>How successful where they?</p> <p>How might your organisation / studio use digital methods for curation in the future?</p>
Networked collaborations – the digital atelier	<p>Printmakers Networks</p> <p>To what extend does your organisation / studio get involved in digitally networked collaborations through the internet e.g. Inkteraction, Print Universe, Facebook etc?</p> <p>What forms does the organisation's involvement take?</p> <p>How significant to your organisation's communication and networking are the online printmakers networks?</p>
The on-line marketplace.	<p>Selling On-line</p> <p>To what extent does your organisation/ studio use online mechanisms / e-commerce in your activities (e.g. for the sale of works, materials or services)?</p> <p>What e-commerce methods are most suited to an organisation such as yours; for example commissioning your own online sales site or using a third party such as ETSY or EBay?</p>

Relating to Research Element: - Emergent forms.

	Target – key personnel in print studios and workshops.
Topoi of Review from Contextual Review	Interview Questions
The technological context.	<p>Technology and your organisation.</p> <p>What would you define digital technology as, within your workshop or studio?</p> <p>To what extent do you use digital technology in your day-to-day (non-printmaking) operations?</p> <p>Do you use digital technologies in the printmaking practice of your organisation? – Please explain why you do or do not.</p> <p>If digital technologies are used within the specific print making practices in your workshop or studio could you please explain how - for example in process, promotion, exhibition, communication etc?</p>
Artistic practice.	<p>Your organisations artistic direction.</p> <p>Please describe the ethos of your workshop / studio with reference to its artistic direction, approaches to innovation and new techniques in practice?</p>
Academic discourse.	<p>The influence of academic discussion.</p> <p>Could you tell me if any of the recent academic discussions as to the significance, role and relationship of digital technologies and processes in printmaking practice have affected your operations in any way?</p> <p>What, in your opinion are the most significant (if any) of these discussions?</p>

Relating to Research Element: -The philosophical context of the digitally mediated art object.

	Target – key personnel in print studios and workshops.
Topoi of Review from Contextual Review	Interview Questions
"Aura".	<p>Aesthetics and Connoisseurship</p> <p>What does your organisation perceive the distinctions (if any) between digital and traditional printmaking to be?</p> <p>Walter Benjamin suggested that technologically reproduced artwork loses it's "aura". In addition the aesthetic of connoisseurship may be diminished for some viewers.</p> <p>What is your opinion on suggestions that that the "aura" or connoisseurship is lost in the digitally mediated print?</p> <p>Do you think there is the possibility of new or differing states of "aura" or connoisseurship?</p> <p>Do considerations of "aura" or connoisseurship affect your organisation's approach to practice?</p> <p>Do you think this has this affected the work of artists working in this organisation / studio?</p>
Digital Medium & Simulacrum.	<p>Production and Re-Production</p> <p>Digital processes provide the theoretical possibility for the endless production and re-production of the digital print, What are your views on this?</p> <p>How might this affect approaches to practice within this organisation / studio?</p>
Materiality & permanence.	<p>Permanence</p> <p>Given developments in printing technology, inks and papers, do you think that early criticisms concerning the material nature and permanence of the digitally mediated print are now receding or are still valid?</p>
Instantiation and temporal form.	<p>Print On-Demand</p> <p>It is possible, with digital mediation, to develop "prints" which may normally stay in a "virtual" state until the artist or the spectator chooses to make it physical by printing it themselves or ordering a print from the artist.</p> <p>Do you think this might affect printmaking practice in the future?</p> <p>How might this affect the work of this organisation / studio?</p>
Authenticity.	<p>Authenticity</p> <p>The adoption of digital methods has led to concepts of authenticity being questioned.</p> <p>What do you think "authenticity" is in a digital context?</p> <p>What defines "authenticity" for digitally mediated prints produced within this workshop / studio?</p>

APPENDIX IIIb Findings from Interviews

1.Emergent forms.

1.1 The technological context.

We're about to undertake a big change to our internal back office finances and administration. We're having an integrated database that's going to link with our finances and feed our website. So it'll provide all the content directly to the website. [Right] So it links our entire database with prints and people and everything. Whereas it all completely linked to the [inaudible-00:05:54]. This would be a live record of what's available in the gallery. Every print that's available to see and, in the next stage it'll show what's available in the archive as well. (Edinburgh-Printmakers, 2011)

The digital area and the digital suite if you like we've designed, not as a standalone thing it's designed as something that is a tool that could be used throughout the studio (Highland-Print-Studio, 2011)

The digital suite we use for a number of different reasons, we have artists coming and purely making work, which will be printed in large format on fine art paper. We have artists who're doing cross media prints between digital and traditional media; we also make film on the machine, acetate, which we supply to silkscreen printers and photo etchers. We also, as a side product, we use it for in-house promotion for banners and things like that. (Glasgow-Print-Studio, 2011)

The workshop as a body; uses it extensively in it's administration. (But) we don't actually particularly use it in production of prints. Um, we've got a very old computer; we're not connected to the internet. And we still operate as a, an artist led organisation with no paid staff. So we haven't actually gone down the road of you know providing computers for our members they have their own. (Fife&Dunfermline-Print-Studio, 2011)

So initially it's just using computers and typical software, Photoshop, Illustrator, Painter, to originate or manipulate drawings, photographs, and that can be just with the intention of printing them out as digital images, inkjet printing, whatever; but we're also very much interested in the use of computers in the almost industrial

context of laser-cutting and engraving, CNC routing and vinyl-cutting, those sorts of things, in order to achieve a particular digital language in imagery. So, I mean, there's always a range - from where you can try and mimic drawn imagery with a computer; you can try to avoid having a digital look to it or you can exploit the digital qualities; mechanical half-tones, vector-drawings, algorithms, things that really show up; pixelation for instance - things that show the language of digital work. (DCA-Print-Studio, 2011)

Within the print workshop, we use digital technologies mainly as a 'step' in another print process. Eg: making a separation for a photographic process such as screenprint or photo litho. Within the organisation we are reliant on digital tech for marketing, documentation etc although very rarely as a final, finished print. (Even then, we have to outsource as we have no printer) (Peacock-Print-Studio, 2011)

1.2 Artistic practice.

Every process with maybe exception of relief printing has some sort of photomechanical way of creating an image on a plate or a screen or whatever. And in all those processes, rather than using a photocopier that we would have used five to ten years ago; more and more people are printing out from the computer either as a starting point or, you know, somewhere the image is quite fully formed before it's outside [sl] [unclear-07:25] so it's [inaudible-07:26]. (Edinburgh-Printmakers, 2011)

Some people don't have access to a computer so they'll come in and work in the studio on Photoshop and manipulate images and some people will have something already on a disc and they just want you to print it out, either on the photocopier because we print onto acetate or from a to inject printer or a large format printer. (Edinburgh-Printmakers, 2011)

Using digital print as an end [sl] form, that's something that's really increased in the last year. We've had a large format printer for ... what is it; two years, three years? And it's ... we had been printing a small amount of work on paper working for artists but it, it hadn't taken off so much. But

now, I think people are realising you can do that and we can, they can rely on what kind of standard's coming out so it's really grown, [Has it?] really expanded. The last two or three months particularly printing, you know, order paper that's [inaudible-08:49](Edinburgh-Printmakers, 2011)

So obviously one of the reasons for setting it up was to produce transparencies, is a big thing that we do with it. The large format printer for screen-printing out for polymer, for photo etch, however it's used a lot. We're really keen on the use of it for photographers and it's also used because we do a lot of community work or community projects, we use the digital for large scale printing for instance on canvas or vinyl, stuff like that. So what we're doing with that is we may be taking something like a lino cut which is obviously hand printed and the rest in studio. It's then maybe taken through Photoshop, moved about a little bit, whatever, things added and then printed large, really large, in some cases five metres. So it's used in all sorts of ways, there's obviously video editing in it as well which is used, we've got people who have professional video commissions who use it. There was someone in last week from social work using it for a little video they were making, so a range really, it's used by so many people. (Highland-Print-Studio, 2011)

I'd say maybe the polymer stuff sums up quite a lot because we're quite keen to, I've kind of strayed in to photography but on my own so I was quite keen on the links of it and the digital side was a possible use for photographers. And then I was quite keen to look at some form of reviewer so I've looked at the traditional method which we might still have a look at in some form but if you do it very traditionally it involves loads of baths and different processes which with the space we've got is very difficult for that. So we had been using Image On, which I really detested so we started looking at polymer plates and I went on a course at DCA on it and then we started working. DCA don't have a great digital facility so their advice was don't use ink jet separations, use laser or photocopy, which the quality is poor. So again this is why we worked away with this thing to get really high quality digital separations and then you know getting the exposures right so we now feel that we're really getting a lot out of the polymer plates. To the extent that, I think Alison was very keen to push the traditional

[unclear- 12:40] but the polymers are working now at such a high quality I think and a lot of that is to do with the source, we'll see how we go with it but the polymers are doing so well. So I think, yeah we get it, there's a girl who prints fabric prints who will email her separations ahead and she's already got them sized to 300 pixels per inch and we just do a page set up and print them out for her arriving and because she's travelling from a distance so they're ready for her. I mean that's quite, it's used a lot. (Highland-Print-Studio, 2011)

The main ethos of [unclear-09:22] so promote fine art printmaking on the west coast of Scotland and beyond.

The digital suite has increasingly, as I think I mentioned, fed into the silk screen particularly and etching in the sense that we can provide film from [unclear-17:10] for making the silkscreen or for making photo etching for the viewer. (And digital printmaking in its own right) the artist has to be involved, there has to be some involvement with a matrix on the computer when it's printed out. (Glasgow-Print-Studio, 2011)

We've always tried to be innovative and bring in artists to, er, show best practice. In the early stages we, we, we were formed as a splinter group from Edinburgh originally and so we had close links with Edinburgh print workshop. And Alfons Bytautas came across to pioneer colour viscosity printing with us when it was quite, fairly new to Scottish print workshops and we've continued. Certainly what we've been trying to do is as well producing in-house courses for newcomers just physically learning how the workshop operates. We also run what we call master classes bringing people, er, from wherever we could get in Scotland to, to conduct classes; artists of the calibre of Kate Downie, Carol Robertson (and) Robert Adam ran a, a set of courses of, um, up to date methods last year and then Paul Musgrove with this photo etching. So in that way we're, we're trying to stimulate and keep people ... it's partly led by demand. (Fife&Dunfermline-Print-Studio, 2011)

Again there are several levels to that. We operate very much on an, as I've said, open-access basis, so there are continually artists coming in, doing their own levels of research and innovation in their own work. Then we are

constantly looking at new materials in terms of ecological questions about materials used in printmaking so there's a certain amount of research going on continuously on that sort of thing - materials and process, trying to make it safer and more ecological and then introducing that to users. There can sometimes be a little resistance to change, but we try to keep everything as open as possible. Then we have the editioning programme with artists who exhibit in the main galleries here - and they are very often major artists with big reputations, but who may not have done much printmaking. And we enjoy working with them largely because they'll throw up challenges, they'll want us to do something with print that we wouldn't necessarily normally tackle and we enjoy finding ways to make things happen. Our initial reaction might be well 'you can't do that' but if we possibly can we'll find a way. So there's a sort of creative innovation going on within that programme and then we have members of the print studio team doing personal research. One of them, Robert Jackson, has just been doing some very interesting work building apparatus and software for drawing using the eye, so for people with disabilities largely. It's basically a little webcam attached to a pair of glasses .. and drawing software. He's been having some success working with that and we're hoping to take that on further. He's also doing research into using the laser technology with traditional stone lithography; so he's laser-etching litho stones and incorporating that into his own work. I'm just trying to think ... oh the other, we have Claire McVinnie who has taken on the new technology and combined it with traditional chine-collé techniques in a very innovative way and she's actually starting up a business selling objects that she's made using those two techniques. Another of the staff Marianne Wilson is researching the use of laser-cutting through layered papers; she's a paper-maker, she's layered up different papers and is, is experimenting with etching through the different layers of paper. (DCA-Print-Studio, 2011)

We aim to embrace tradition, innovation & experimentation - to be more radical about our use of print technologies (Peacock-Print-Studio, 2011)

1.3 Academic discourse.

I don't think it had a direct impact perhaps on what we're doing or how we think about these things. But I think perhaps in the ... you know, in the more ten years sort of timescale, when digital starts to become print; at that stage if that kind of debate I think was bigger change of methodology, of widening the sphere of what print and it is for an artist, what is, what's a new tradition.(Edinburgh-Printmakers, 2011)

There were ... there was thing, at the symposium in Seacourt which Seacourt organised last year ... a lot of that was about authenticity and the nature of traditional printmaking within the digital age and all of that. And amongst the discussions and the things that were drawn up from that were how to define digital print within tradition and they had people like Marge Devon from the Tamarind talking about how they felt about it [Yeah] and they had people trying to put their standpoint as to where it all fits together. (Edinburgh-Printmakers, 2011)

I don't, I think we tend to make up our own minds really so I wouldn't say I've referred to academic papers or anything on any of the controversial issues if you like on digital and a lot of the digital work we've done ourselves, we're kind of self taught on really.(Highland-Print-Studio, 2011)

I've been aware of the academic discussion but I've been quite convinced by my own beliefs as such,(Glasgow-Print-Studio, 2011)

I mean there's the endless question what is a print. And so it is discussed, I think it's having a slight impact. I mean I, I know that all three of us sitting round the table the tape we're making today so through that I'm aware of the debates and I'm aware of, er, we get things coming in which are highlighting digital from technology and courses and I certainly think there are a number of our members who are quite aware of all of these ... issues What, what is a print .. It is a very difficult question because, um, we kind of go with it ... we're producing, er, a hand printed artwork editioned [ph] by the artist. As opposed to editioned by someone else but that's, that's another issue.Um, and we're very much fighting against, digital image making such as Giclée prints ... And, what, what we find particularly upsetting ... in fact we've got a recent ex member who now

translates her paintings into Giclée prints which are on sale locally, as prints
So that's, that's awkward. But I'm aware of, er, what I truly accept as
prints which are digital images that are produced in a different way. I
understand that that's another area of work. And I don't know at the
moment that we ... well we don't have facilities to work that way so we
would be pointing people ... for example if we require a specialist thing we
contact Edinburgh and we have a reasonable relationship with
them.(Fife&Dunfermline-Print-Studio, 2011)

Mm, well, I would say that we have, or rather I have, been looking at issues of
authenticity with regard to the use of digital technology; going back to that idea
that you can either disguise the use of computers or you can celebrate it. You can
use the particular qualities of software or hardware and incorporate those into the
look of a work, the language of a work - as you were talking about. I've also been
very interested in the notions of the artist as someone who selects from a cultural
sphere in terms of how they're likely to pick up on commercial use, industrial use,
throughout history. Artists have always been very interested in latest technological
developments. Now everybody's looking at 3D printing (rapid-prototyping), for
example, and as these things become available and they're no longer only available
to research units and universities and things, artists are always in there
experimenting. (DCA-Print-Studio, 2011)

Yes. I attended the symposium organised by Seacourt last year and have listened
to many discussions at Impact (Bristol 09) and SGC (Chicago 08). I find it
interesting to hear the strong opinions printmakers hold on the subject of 'digital'.

@ Seacourt - Hearing the Directors of some print studios explaining why they feel
it's alright to sell reproductions of their prints versus other Directors who stand by
the 'original'. Outcome - it's our role as printmakers to educate and not mislead our
customers. Original v Reproduction. (Peacock-Print-Studio, 2011)

1.4 Transition to new printmaking.

I think there's a noticeable shift. I would see that in some workshops that
I'm aware of, there's more artists using digital printers at end point [sl]. I
think Glasgow because they've had a digital facility for a bit longer. They
had a large format a couple of years before us and I think there's ... I think
maybe, also at The College of Glasgow there's a ... it seems like chaos here,

a bigger contemporary artist culture because it's cheaper to live there and there are a lot of graduates are moving to Glasgow.

This show that we've got just now; John Goto, being entirely digital print [Right] with exception of one because it has a screen printed layer as well. That's unique; that's the first time we've had an entire show that's digital print. (Edinburgh-Printmakers, 2011)

if we have a power cut, we have a big problem, unfortunately that is a factor. Or if our internet server goes down then everyone has a breakdown.(Edinburgh-Printmakers, 2011)

In the print studio: I would say that we, there's maybe about ... there's probably about a third of the artists that work without any digital input. There's maybe about a third to a quarter that use pretty much exclusively digital and then the remainder use, cross over, you know they might use acetates ...(Edinburgh-Printmakers, 2011)

The thing that worries a lot of print studios is, you know, people see the kind of dooms day scenario that every print studio, that every college is going to close down their print department. No one's going to know how to make traditional prints and the end of the world will come about. But I don't think that is going to be the case [No] as long as print studios take a major part in education and they ... it may unfortunately be true that educational institutions will stop being the main educators in printmaking because there's just no money, all the money's being piped [sl] out of education.(Edinburgh-Printmakers, 2011)

It's difficult to say, I mean if you looked at it in terms of classes and popularity, I mean when we were in Longman in the old studio, the digital class was one with the biggest waiting list. Now that we're in here and it's a really nice facility and stuff, there is still demand for it obviously but the other classes have caught up big time. So if you look at the amount of classes, if you take that as an example, I would say you're looking at 20% digital, something like that, maybe less, 15% of the classes. It's harder to say because it's used as a tool in other areas of the studio in terms of user share it might be a bit more but it's certainly not dominant. I mean there's

no plans for it to become, I know some studios have dropped lithography for instance to increase the digital output but we've got no intention of doing anything like that. You know, it's mainly to be something that's part of the studio but it's not in any way. (Highland-Print-Studio, 2011)

(It's) hard to know what the technology is going to bring, I don't see anything becoming accessible in the very near future. I mean there's a lot of technology out there that's being developed and you see a lot of stuff on the technology programmes and read in magazines, but we're still way behind as far as real holographic 3D goes or things like that or virtual reality. We're still, from what was sighted 15,20 years ago you'd think we'd all be sitting with headsets on now but it hasn't quite happened and desperately struggling to get proper 3D TV as in holographic TV together. I saw some stuff the other week about it, it's still not there and it's going to be a while, so I don't really see (it yet) we're finding that artists are using obviously that kind of technology (touchscreens & projections) in exhibitions a lot more. I myself have done various exhibitions with the animation on the monitor or the light boxes as an integral part of the exhibition. Progress is slow, well development is slow, again because there's still an element of inaccessibility to the technology. (Glasgow-Print-Studio, 2011)

Dunfermline - traditional some home based digital in process

I would say it's still very heavily traditional as far as that goes, I mean even with the very traditional printmaking it's well established now that people, even if they don't realise they're doing it, are using digital means to produce separations or positives or just transfer their image to a plate. Even putting it through a copier, as we now have a digital photocopier that's automatically putting half tones on it for them and so ..., I think it's so taken for granted now because of course as we teach classes we teach them how to make digital positives and so forth. But, yes I would think our membership are still very keen on actually using inks, oil based inks, printing from plates, printing through screens, (DCA-Print-Studio, 2011)

Traditional methods are more commonly used, as that is where our staff's specialisms lie. Using digital process to produce marks onto traditional plates etc. More crossover between digital and traditional outputs (e.g.

screenprinting onto a digital photograph) or using tech to prepare surfaces - laser cut etching plates, Perspex to be printed onto etc. (Peacock-Print-Studio, 2011)

2.New Materiality & signature.

2.1 Post-physical forms.

The nature of making work on screen is a ... is such a natural process. I think it just takes a slight mind set for artists who have worked in print previously to start seeing something other than a piece of paper as an outcome. It's not in any way kind of ... that's not a leap for an installation artist; artists that have worked with photography, worked with projection, you know? So there's no reason why printmaking artists can't work within digital means to make an image and choose not to physically print it if they want to publish it on the internet then ... or project it as a finished work. I've done it myself. I've made works that actually don't become ... haven't been printed out. [Right] I think, I find that interesting but I find mostly I want to print something out or make something physical. [Right, okay] but there's really ... lots of benefits from not printing something out as well as ... you know, there's pluses and minuses; it's nice to make something that's not scale sensitive that you can fill an entire wall with by projecting it. That's a great possibility. I think it's maybe a little bit harder for printmakers to give up the habit of ending up with a print on paper. It's just a, you know, there's no reason why they couldn't be working on projected installation or using internet art... which they could have done previously. (Edinburgh-Printmakers, 2011)

Who knows, I mean we certainly wouldn't be against that although we would always feel that it's never going to be a substitute for physically having a physical object I think there was a big potential for giving a misleading impression as well, that's the other thing. So it's something that we'd maybe use as an additional thing but I don't know if it would work on its own, maybe, it would have to depend on the project. (Highland-Print-Studio, 2011)

I think development is very slow, I think artists and designers from the graphic world, I don't really like the term graphic world but you know what I mean, are utilising this technology far more. I think there's still a traditional element here because a lot of the work produced here at the end of the day is hung on a gallery wall and presented within a traditional fine art gallery format and I would say 90% is geared up to be that way. I mean it's changing and there's some quite exciting projects and a lot of interesting stuff has happened but relative to the Print Studio and the other Scottish workshops we're still in a very traditional infrastructure. (Glasgow-Print-Studio, 2011)

I think they're great for, um, people who want to for example make a, an artist book which previously they might have printed it all up by hand and assembled it and constructed it and bound it and so forth. And, and they consider now kind of making it all within the computer and then publicising it, publishing it as it were and then it's available to people to interact with and have and it's, it's quite liberating in a way that you kind of don't rely on a gallery to do all of the that for you so you can be much more independent. (Fife&Dunfermline-Print-Studio, 2011)

It's not quite where we are yet, I mean I can imagine that there will be a time for instance when we'll have a print-on-demand machine for books or artwork. Obviously that's not then electronic as such but I think we're, as a production unit, always going to be looking for a physical object to be produced. So I mean I can imagine that that we might be downloading books and images and printing them using that sort of technology, because I don't see that there's any need really for an open-access virtual eBook studio, people are able to access all this themselves so easily that, in a way our reason for being is that we're providing equipment and technology that people don't have access to, as a general rule. Yes, I think that's probably already very much the case, I mean the artists book, as opposed to the digital eBook or whatever, is still something that artists want and as I say the print studio is going to be interested in I think, producing actual objects, physical objects. And I, well certainly I know college after college that's got rid of their linotype presses for example and gone over to computers, the students have all found their way, just as fast as they can, back to someone

who's got a linotype press ... So I think there is always going to be a sensibility of valuing the actual physical qualities of something - valuing the slight emboss on the page or the slight propensity for mistakes as opposed to digital perfection. So I think that all things which combine in a, in a as you say connoisseurship, where valuing the sort of slight differences in an edition even, as opposed to an electronically produced edition where everything is absolutely identical, people are starting to value the fact that there are slight variations in inking between images, that sort of thing. In a way I think that will only grow. (DCA-Print-Studio, 2011)

2.2 Fluid permanence reversible process.

People who are more familiar with Photoshop are using the computer as a fluid way of sketching and making soft proofs, finding out what it is they want to produce. And I guess it then goes two ways; they either feel that they've resolved something enough that they want to then digitally output it or they take that into printmaking and then they ... that gives another set of possibilities of what they can ... how they can explore it a bit. But it might be based on that original digital sketching [Yeah] which is a quick way of doing it but gives different options again. (Edinburgh-Printmakers, 2011)

I think with digital work as you say the process can go backwards or forwards, it's very fluid, you can make decisions and change your mind, you can produce the work on a different scale, if you've got a reasonable resolution file you can produce it as a huge piece of artwork or a tiny piece of artwork. And you can also easily produce a series of work based on the same core idea and obviously once the initial matrix is set up, it's a far quicker process, or it should be a far quicker process except you've got so many options. Because you can do that sometimes some of the artists can't see the wood for the trees, if you know what I mean. When you're doing traditional printmaking there's a point where you are committed to the way that the print is evolving, obviously with an etching plate you've bitten into the steel or the copper or whatever, with a silkscreen print you have printed half the edition and you can't go back and reprint, well you

can but you don't, it's better to [unclear-24:21]. So you're committed at one point, the digital print until you push the button to print it out you're not committed at all. (With reference to changing the way artists work) - I think in the immediate future I think most of the artists that I deal with want a final product, they have a deadline or they have an exhibition, again still within a traditional (end in sight)(Glasgow-Print-Studio, 2011)

Well I mean I, I personally do when I'm making my works. I try things out on the computer in relation to what I'm doing physically. I find that extremely helpful and labour saving. I'm sure other members do the same. It's difficult for us to tell because everyone does that part. At home.(Fife&Dunfermline-Print-Studio, 2011)

Yes absolutely and again it's something that I think we've now started to take for granted when we're teaching beginners in digital processes, it's very much a matter of saying well, this is a way of trying things out before you make a final decision, you see what it looks like in this colour. Or it's the way we teach people to use the software and I think it's what most of the artists use to sort of play around ... I mean I remember starting using computers and being amazed that it was, it was very much the equivalent of having a vast range of different papers and paints and using Painter as it was then, Corel now, to the point where it's almost overwhelming, it's hard to make decisions, but now I think again it's become so normal in a way that we don't think of it anymore. I think the generational difference is still very much around people who have not used any graphics software at all before. I think once they've been through a course then they will automatically have learned how to use it in that way or to think about using it in that way even if they're not fluent in it. Obviously the younger people, the younger generation, just do it without thinking. (DCA-Print-Studio, 2011)

Artists who are competent enough sometimes experiment with colours, layering on their computer before we begin a process.(Peacock-Print-Studio, 2011)

2.3 Beyond signature.

It's not really what artists are particularly interested in. It's more what the galleries and the dealers have to worry about in terms of [Yeah] putting the

price tag on the work and saying this should be more expensive [Yeah] because ... I think artists are quite happy just to make images and on the whole [Right, yeah] you know, I don't think they get so worked ... it's almost an irritation to have to then deal with fitting the work into the right, you know numbering it in a certain way (Edinburgh-Printmakers, 2011)

I suppose it's like the music industry isn't it? The copyright, it's impossible to police it. (Highland-Print-Studio, 2011)

Traditional, we just go for a traditional way of presenting fine art prints, which is edition number, title, signature, and date if you want it. (Glasgow-Print-Studio, 2011)

Well, I feel that the concept of the edition really is not an artist's concept; I don't think artists came up with it, I think it's purely dealers and it's purely to suit their commercial operations. And there's a lot of interesting work been done by artists about the notion of editioning, Felix Gonzalez Torres in particular, and again, one of the second most frequent questions I'm asked is about 'how do you sign a print' and 'how do you decide whether it's an edition if prints are slightly different, do you number it as part of the edition or do you do 20 artists proofs because they're all different'. We enter these labyrinthine conversations about edition numbering. And I'm always keen to stress that this is simply for the convenience of dealers, all these traditions, I do know them all and I can explain them to people but I'm also saying you don't actually have to do it. I think it's something that people get in their head about print as well, this notion that, if you produce something you have to produce an edition of it; I know I did as a student, I editioned everything, I've still got a chest full of all these useless editions, (DCA-Print-Studio, 2011)

3. Modes of consumption.

3.1 Curating the digital.

We couldn't do it without it. I mean we've had to do it in a more, in a more problematic, less easy to work with method because we've ... just in terms of managing our images and sourcing those images which is where a

database should help to be able to browse with images and browse every print that we have. [Yeah] And any [unclear-44:37] we've ever had, you know so ... (Edinburgh-Printmakers, 2011)

All our ... exhibition applications are by digital file. [Right] You know, we don't want to see slides. We sometimes get hard copy, but we don't insist [sl] on it. So we're happy to take exhibition proposals and we select every project now from digital images. Every print that we take into the building we want a photograph of it. [Right] We ask the artist to provide photographs and give them guidelines on making sure they're good quality. But basically, yes, that's become [sl] an intrinsic part of our stock control, management and ultimately our promotion. (Edinburgh-Printmakers, 2011)

We don't have a gallery ourselves we're kind of quite sensitive to actually how inefficient cost wise galleries can be. So the plan was to make use of other spaces or existing galleries if we want to do any work. So we've got a couple of shows, which are touring about just now, Like any information, email information is designed and produced digitally and emailed out, so yeah it's quite a big factor. (Highland-Print-Studio, 2011)

We also have an archive now, I've got funding to get a part time person to help and archive the entire print studio, obviously it's in physical form but also it's on the internet in digital form as well so you can access pretty much every published print that's been done here since the inception of the studio that we still have records of, well 1972 so it's going back a little bit. The archive site was quite recently done, that was last year, so we have basically it's not just the prints it's also photographic, documentary, about everything that's been produced, there's a lot of stuff on the site. (Glasgow-Print-Studio, 2011)

We've just, um, received the other day back some prints from Hong Kong, um, and that was an interesting experience because that ... um, I did most of that because it was, um, done on the inter.. through the Internet entirely. And it was ... their system was quite impressive wasn't it with the ... You know we had to send all the images and details and everything so ..I don't think we would have been aware of it. No. But in terms of virtually any exhibition nowadays that we put on and we put it on ... we're about to do a

second exhibition in, at Five Space [ph] but we've just had an exhibition at the Scottish Arts Club and we as a matter of routine now send, um, er, er, a computer generated invitation along with the old fashioned hard copies and a lot of our publicity is, is done in that way. (Fife&Dunfermline-Print-Studio, 2011)

Well again I think probably as a matter of course; private view cards, invitations, there has been a lot of work on archiving on the DCA website for instance, so there's always a movement towards more and more information, more images being available online. Well to some extent I think we're not as far advanced as we'd like to be with the sort of website side of things simply because it's tremendously expensive and labour intensive to manage a really first -class website and although we're important in contemporary art we're a very small organisation, we don't have a lot of staff who can, be managing a very active website. But it is constantly evolving and we've recently got more funding again, so there is always, I mean -even since I started here a few years ago - there is information about all the courses online, there's information about everything we do online. Well we don't actually do much in terms of just print exhibitions. The exhibitions here are by invitation only so it's not really that kind of gallery, but we do respond to them.

Peacock all handled by marketing -

3.2 Networked collaborations – the digital atelier

We have a Facebook page and a Twitter and we have a page on Interactions, all the staff have, all the print staff have profiles on Interactions. I wouldn't say that they use it so actively now and I know myself, I haven't been using it as actively of late. But Facebook is something we've particularly ... we, it's a weekly update and we ... at the very least. We see it as quite important to use Facebook and Twitter in a really proactive way, because we've noticed it can bring people in. [Right] You know, for the gallery particularly, but we also promote the student courses etc. But for events in the gallery, I mean we had several events that we know the majority of people have come about because they've seen

it on our Facebook, they've been invited to it from friends of theirs from Facebook, etc.(Edinburgh-Printmakers, 2011)

I can't think of an example that we've done that. Networks with other print making places, I mean obviously we have contact with Glasgow and we have lesser contact with Edinburgh but it's really just very informal, very little contact with Peacocks at all. What we've got more contact with is other arts organisations within the Highlands (Highland-Print-Studio, 2011)

We have a presence on Facebook and a presence on Twitter as well. Other than that [unclear-31:25] we don't have a particular [unclear-31:29]. Some of the artists involved here are interested in other places and we do have a, I have spoken at symposiums and things like that on digital printmaking or fine art digital printmaking but aside from Facebook and Twitter we're not actively involved with any of the networks at the moment. That's not to say we won't be, for example I don't take responsibility for Facebook and Twitter, I just don't have time to do that, so that evolved from our sales and marketing person who saw that as an opportunity to promote the studio in another area, Flickr as well, a lot of the artists have got stuff on Flickr, we've got stuff on Flickr as well. We've got a workshop users group or something like that, which is really just targeted at members who use the workshop,(Glasgow-Print-Studio, 2011)

As an organisation I don't think we've been doing anything like that much have we? Partly because the organisation we don't have a phone line never mind an Internet connection. It's more expense and you know we think carefully about these things.(Fife&Dunfermline-Print-Studio, 2011)

No we don't have anything like that, obviously individual staff have Facebook pages and some of them are on sites like Folksy and Etsy, where they sell their work. But to be honest I don't think I could cope with keeping up Facebook pages and things like that, we're just snowed under so much all the time, so we haven't really exploited those opportunities yet. (Thinking internationally) I think we're in a slightly different situation really in that, because it's harder for people to get to Dundee we tend to focus on people who are already living quite close, although we do get a few people coming from further afield but we're already pretty much at full capacity so

we don't ... I guess if we were running out of people coming into the studio we might be trying these things out to get more people in but at the moment we don't need it. I should actually say that in terms of if we did want to start a Facebook page or anything like that it would have to be because of being part of the DCA it would all have to be sanctioned and monitored and approved by DCA rather than just the print studio in case any conflict came up in terms of branding. Because it is very important to all of us to be seen as one organisation, not a print studio *and* DCA - we're all part of the same organisation. So I certainly don't think the print studio would set up anything like that of its own back without it being part of DCA. (DCA-Print-Studio, 2011)

I use both Inkteraction and Facebook regularly and keep in touch with my International Printmaking contacts via these. I find the discussions very useful and encourage our users and students to join Inkteraction.

Peacock has a Facebook page but it's used more for marketing and exhibitions than Printmaking. I rely on being able to contact fellow lithographers quickly, whenever I encounter a problem and need assistance. (Peacock-Print-Studio, 2011)

3.3 The on-line marketplace.

We've been selling through Original Prints for the past five years or so, I think. [Right] And we use, we send out work to various auctions as well; [Right] so yes, but as I say not indirectly because we haven't had the capability to do it. (Edinburgh-Printmakers, 2011)

But not so many arts organisations where we can take a model directly from because not so many were actually interested in selling online and having a website that could give them that kind of functionality. [Yeah] Because some are quite suspicious about ... they don't think there would be a market for people wanting to buy a physical print based on a screen view. [Yeah] Having seen a little JPEG of the print and, you know ... [Right] I think that's a quite a common thing, but then we looked at people like Eyestorm and Original Prints and that's how they operate. You know, they

entirely operate out of the website [Yeah] so there is a market and there is a need to be able to do that easily. (Edinburgh-Printmakers, 2011)

So a simple thing now is people, people can now book on to classes and pay over the website which has just happened in the last few weeks so it's a big change. , you can buy prints online as well. We haven't sold (yet), I don't know how that will go but the capability is there anyway. (Highland-Print-Studio, 2011)

For some time now, I'd say for at least five years if not longer, you've been able to buy a print, you can order a print online via the Print Studio, you can complete a form and that's been there for a long time. The particular print links all through, you get the price etc. and obviously the gallery will respond to you. We've been talking about setting up an online shopping cart within our own site for quite some time, the Cultural Labels site started last year. Prior to that we tried eBay, we did try an experiment with it, we didn't get great results from it. Cultural Label, we've had a couple of sales but it seems to me sometimes it's what we're expected to do, the Arts Council are very keen on all this, they're all very keen, great, sell more work. Just how much fine art work we will sell online, I mean if you're going to buy an Elizabeth Blackadder silk screen print that costs £2,500 plus VAT, would you not like to perhaps see it before you buy it? (Glasgow-Print-Studio, 2011)

We don't - we have, we have a web page and that has links to individual artists ...and the theory is that somebody could click on ...and decide that (they) want to get something. But we haven't, we haven't got it sophisticated enough. I remember mentioning it one time us possibly having a thing on something like Etsy but, um, oh I don't know it just got lost ... (Fife&Dunfermline-Print-Studio, 2011)

The main, the only thing as far as the print studio is concerned is that we advertise courses and workshops through the website, the only other thing, well, the DCA shop has recently gone online, they are now live so that you can buy online from DCA shop. And as part of that the print editions that we make here with artists are advertised for sale through DCA website, but not the open access member prints because we don't feel like we have enough control over how many are in an edition and so we might only have

one work by an artist that's in the shop and having conflicting sales outlets is confusing.

Online sales - It's the DCA editions. They're for sale on the DCA website, they're also now on Culture Label through Creative Scotland. They've set it up, and again I think all the print studios now are represented on that website. Well it's great really because we did try to set up a joint website with the four studios which, again because there was no one who had the time to manage the website, you really need someone on it, looking after it 24-hours a day really to keep everything running. And nobody has excess staff to do that in any of the organisations so Culture Label is great because it's a much better set-up website and somebody is managing it. We haven't made a huge number of sales yet but it's hard to tell because there is also a way that people can move through, there's a link to the DCA website so the sale might come through there or people might have a look on there and then say 'well I'll go in and have a look' so they come into the building and buy. So it's not always easy to track sales but those are our two main outlets now for edition prints, Culture Label and the DCA website. And the Culture Label also offers the Own Art option, which is interest free, so that's also a great help. (DCA-Print-Studio, 2011)

We have an online print store where we show all of our works. We were encouraged by Creative Scotland to become a part of Culture Label and are selling through that (but only prints, no materials) Third Party, such as Culture Label, seems to be working for us. (Peacock-Print-Studio, 2011)

4. The philosophical context of the digitally mediated art object

4.1 "Aura".

I think it really [unclear-24: 19] the nature of editions [ph] I think, in particular and how artists work with editions and how publishing houses work with editions. And of course that has a big effect for things like value and rarity and all of those things. It's not really what artists are particularly interested in. It's more what the galleries and the dealers have to worry about in terms of [Yeah] putting the price tag on the work and saying this

should be more expensive [Yeah] because ... I think artists are quite happy just to make images and on the whole [Right, yeah] you know, I don't think they get so worked ... it's almost an irritation to have to then deal with fitting the work into the right, you know numbering it in a certain way or ... (Edinburgh-Printmakers, 2011)

I think it's the plus ... it's like an online catalogue. It gives the necessary background to allow people to go a little bit deeper but then of course you've got the nice thing that you can actually hear the artist's voice or see what kind of haircut they've got, you know? Or be inside their studio in a kind of intimate way that you wouldn't be allowed to ... (Edinburgh-Printmakers, 2011)

I think it's a new aura. For sure it has a different feel I think we've been very much consumed by the glossy photograph and the kind of aesthetic of that for a long time, and I think digital print, on the back of that is regarded by some people as being just an extension of that. ... It's important to step in that direction or to embrace showing new work by taking the public along with you. (Edinburgh-Printmakers, 2011)

I mean there's an interesting thing with this one, printing the summer set, if we print out a flat light blue square on it, I think you would be really hard pressed to distinguish that from a screen print of a light blue square, the way the ink sits on it. It actually achieves a consistency that you'd be utterly delighted with from screen-printing but then screen-printing is not really artist quality inks, it's a commercial process that's been adapted by artists so it's probably more comparable as well. It tends to be more kind of an acrylic type colours, the screen isn't it, rather than the artists' colour. Whereas there's a bigger difference between a polymer gravure inked in oil based (ink) like charbonelle. (Highland-Print-Studio, 2011)

Take photographyif you look how they print out the photos at home and they're worse than the photos that were taken 20 years ago with film and then they fade because they're doing it on cheap paper. So there's an awful lot of that kind of visual pollution. The other end is, I mean I'm fortunate enough to have a Leica camera, digital camera, which produces images, which are just utterly stunning and have all the soul you want in them and they're done digitally. So there's an absolute magic to what it does but it's doing it in an entirely different way from the

mass-market digital product. So I don't think you can say that it's not possible to have that because there are ways to do it. I think unfortunately it does cost, that's the thing so it's not the instant process that it was cracked up to be, it's not that, but to say that you cannot, that it loses something I think that it's getting to a stage where there are ways to do it I think that it can really work its way, really well. (Highland-Print-Studio, 2011)

I mean the way I've started talking to one or two people about it as well is that you kind of actually talk to people in monetary terms so you say you buy a Giclee print it's got absolutely no second hand value whatsoever. Whereas if you buy an original print it does, so if at some stage in 30 years time you go to an auction with it, you'll maybe get something for it. (Highland-Print-Studio, 2011)

We're seeing people, well again it's a relatively short period of time that artists have had access to this technology, a lot of them, like myself, have been finding their feet with it, very much traditionally drawing, hand drawing skills and it's learning to use a different tool and adapt and try things a different way. So I think the artists have been developing their work as we go along, I think people's attitudes to digital prints, just for the very reasons you've said, the look, the touch, the feel etc. Actually it reminds me of when I was over in Mexico, and in Mexico they have quite strong etching and lithography print publication, there's still a resistance to silkscreen, same as here and the States, the resistance to silk screen when it came along as a fine art form, of course now it's completely accepted. People will argue 'oh but digital prints are so flat' this sort of thing, again my argument is 'well that's the only way that image can exist'. So until we start, perhaps we might see technology that allows us to build up layers, things like that, it's possible, it's not with us yet, it's not going to be in a workshop like this for some time to come. So I would argue, my argument has always been it only exists like that, that is the way that you have to accept it. Now some buyers, connoisseurs, some artists, of course widely varying opinions, I would say there's a greater acceptance, a much greater acceptance in buyers and just generally artists towards digital prints, it feels as though it's kind of accepted now although there is still going to be resistance here and there. (Glasgow-Print-Studio, 2011)

There's such a wide range of people purchasing prints, connoisseurs there's a degree of resistance but if they like the artist they're going to want to, if they're a collector they're going to want to complete the collection, whether it's model trains or fine art, if you're a collector ... And if the museums, the RA and the RSA and the RGI are showing and presenting this work and awarding prizes to it, it does help the kudos level. (Glasgow-Print-Studio, 2011)

The only thing is that (reproduction) does make it possible for somebody to ... who couldn't possibly afford to buy you know a certain priced artwork to be able to have it up on their wall the important thing is about knowing ...the knowledge about how things are made. That's really important and so to people being able to respect and appreciate that side of it and the artist's intentions that's very important. You have to, to at least expose and show people, er, the quality of art and, and seeing what images are around because they're faced with raw quite basic images that bombard them from everywhere. Er, and if ... you know just understanding or, or thinking about what might be of quality or not, um, I, you, you ... there is a difference between just getting cheap reproductions of whatever it is and understanding that what we might be doing might be different. (Fife&Dunfermline-Print-Studio, 2011)

it's a complicated area again about authenticity isn't it? I think first of all you have to exclude the kinds of prints that are basically the same as painting, the monoprint, for instance, where artists are using a particular quality of mark or to obtain a particular look. I think the notion of reproduction in that type of print can be very secondary but I think other artists are using the notion of reproduction as the main concept of the work - so the Nancy Spero giveaways or Barbara Kruger's work, all that generation of people working with print that is mass-produced, unlimited editions, Christopher Wool and Felix Gonzalez Torres. Practically all the work that Andy Warhol did; it's all about reproduction and reprographics and making multiple copies, mass-multiple copies, and the work is about mass-production in society so it's, it has its own aura I think, which is very applicable to our times. (DCA-Print-Studio, 2011)

I believe that the level of the artists involvement would contribute to the 'aura'. Every artists' involvement is different, regardless of which process they choose to work in. In my opinion, whether an artist cuts their own relief block or insists that the printmaker do it for them results in a different print and level of connoisseurship.(Peacock-Print-Studio, 2011)

4.2 Digital Medium & Simulacrum.

Well, it's really ... I suppose I think I had an interesting conversation with someone who came in who wanted to have a digital print made. They had a print that they had produced in another print studio where they were only allowed to print one. Because, in that studio, they didn't want to ... they didn't allow to edition digital works. [Yeah] I think from the point of view of not encouraging reproduction. [Right] And so we had a little conversation about this and I was saying that I thought this is just the same argument or discussion you have to have with any artist that start making ... about how they label and how responsible they are with being clear about what they've produced. So, you know, and we don't have this conversation with every person that comes to do an etching course and say: you're only allowed to print one. We just have to explain to them about the conventions of signing and editioning, you know, giving edition numbers. And I don't think it's any different. (Edinburgh-Printmakers, 2011)

We're quite strong on the policy of [reproduction] and I think we just see it quite clearly in our own heads and that's our policy. I guess we can't stop other people doing it but we do try to educate people as to why that's our policy and hopefully they might see the reason why. (Highland-Print-Studio, 2011)

It's something we get asked a lot, you'd be amazed at the amount of people who come in with generally a watercolour or something asking if we can print 30 of them and so you just have to explain why not. I think what we've put in place is that there's obviously areas which, the digitally produced print is one as opposed to Giclee, I think Giclee's quite clear cut. The digitally produced print there's a bit more variables in it, so I think on these issues it's something that we would say 'well we can print one but we'll discuss' because I think we'd have to see the work as well and just discuss what their intentions were with it, stuff like that. Because I think the main policy is the protection of the original print so that would be how we would approach it. (Highland-Print-Studio, 2011)

Yeah I guess so because well reproduction is reproduction, I would define these as original prints. Also one of the explanations I use is [unclear-41:29] about digital printing and I sort of say to them 'do you know artists 100 years ago, 300 years ago, would have killed for technology like this,

they would've exploited it, they would've used it' and we have the luxury to prevaricate about it, Picasso would've used it to the hilt, [unclear-41:53] Salvador Dali didn't get hold of it because we've got enough reproduction Dali's out there. But no, I mean looking back through art history artists would've killed for this technology, I really do think so. (Glasgow-Print-Studio, 2011)

We don't have a production facility there but if I ever do some digital prints even just say with an emboss element I always keep it to about twelve or twenty, whatever, would only ever be the most. (Fife&Dunfermline-Print-Studio, 2011)

Again, I welcome it where it's relevant one of the things we've done here is look out for events for instance where the Guardian occasionally publish a David Hockney or a Gilbert and George image or Chapman Brothers we've done. They do it as a free download for 48-hours, anyone can download it, so we do the download and then we print it out on a digital printer in archival inks and on archival paper and make it available for people to buy. Because although anyone can download it they don't all have access to high-end digital printers, and we're very upfront about it and we say this was a free download and this is what we're charging you for. I think again that is a, it's a very valid way of using an artist's work and the artists obviously want those works to be democratically available so we're just facilitating that. (DCA-Print-Studio, 2011)

So do traditional processes such as stone lithography, yet we choose to be firm and destroy the matrix. I think the same should be done with a digital file once the edition is signed and archived. As a printmaker, I'm strict about these issues yet from a sales point of view, colleagues are keen to keep financially beneficial options open. (Peacock-Print-Studio, 2011)

4.3 Materiality & permanence.

I don't think they're (questions digital ink paper permanence) still valid, I have to ... I don't have any proof of what the manufacturers say [No] but you know, I've produced digital work myself so I can believe it enough to do

that. [Yeah] So it appears that they're completely ... they will still ... those days are gone; looking at the quality, it's a long way from where it was ten years ago (Edinburgh-Printmakers, 2011).

I think they are still valid, I think you can see a difference between the large format Epson and a really high quality desktop and once you're used to that everything else seems rubbish you become a snob. So I think there are definitely concerns (Highland-Print-Studio, 2011)

As far as we know the inks we use now are high pigment, they're [unclear-48:28], no one's been around long enough to see if it's still going to be here in 100 years but they have been tested so we can only believe that that's true. All the paper we use are traditional fine art papers, they have a coating on them but as with any work of art on paper, you wouldn't deliberately expose it to sunlight every day. So I'm quite confident of the durability. Yeah. I've been quite, compared to the early days when you could basically print something and within a month the colours have changed if you stuck it on your studio wall, it's a completely different ball game now. And funnily enough interestingly today, you know we can print on the canvas and banners and all sorts, there's a Russian cultural centre downstairs [unclear-49:34] and we printed two long banners for them which have been hanging in the window on canvas since September 2009. Broad daylight all day, and as I went past this morning I went my god that colour's still really good, still really fresh, vibrant. I mean I'm sure there must be a shift in it because it's been getting daylight, I know we don't get a lot of daylight on the west coast of Scotland [both laugh], I'm quite impressed with it. (Glasgow-Print-Studio, 2011)

I think that, er, people were a lot more concerned about it initially. However I'm, I'm not quite too sure at that point if for, for example pigment based ink wasn't about at that time. It's a lot more about available and used by people now. I'm still concerned about it myself. I can't afford to pay somebody like Wilhelm's Research Institute to take some of my prints and do tests on them. But I just ... because it's pigment based ink, it's good quality paper; all the other materials there are archival and that is

supposed to archival I'm just hoping for the best. (Fife&Dunfermline-Print-Studio, 2011)

I mean the advent of archivally tested inkjet inks has completely revolutionised all that because even 10 years ago we were having to tell people if they bought a digital print that it could fade within a few weeks, months, it could change colour and that was with, at the time, the best quality Epson inks that we could get. I mean now we can tell people that this is guaranteed by Epson not to fade. Nobody will know for 100 years whether that is true but at least it has been tested and comes with some sort of assurance. So I think that is, it's part of the problem we were talking about with the proliferation of Giclee editions but again I think it's down to the contract, if the artist tells the buyer what they're getting very clearly and the buyer is aware that this is a digital reproduction of a painting or whatever that's fair enough. What I object to is where you see a sort of blurring in the way that the Giclee print is presented as a hand-made original print for instance. (DCA-Print-Studio, 2011)

Within other areas of printmaking we use handmade inks and papers which we trust are archival and these go through far fewer tests than digital inks. (Peacock-Print-Studio, 2011)

4.4 Instantiation and temporal form.

I think this is exactly the same as most, the way that most etchers work. [Yeah] Most etchers that I know, print on demand, they'll print five up at a time. [Right] They don't want to edition all the plates up first because they don't have enough time and there's no need. So again, it comes back to being responsible about how you do that. And I know that there's some schools of thought that say that all digital original print should be one strike; you should print it all in one go, and that's it. I think that's kind of missing the possibility of the medium, and that's just ridiculous. [Yeah] Why would you? Why would you? Each process has its pros and its cons, and I think that's one of its pros. That has its drawbacks as well though [Yeah] because, you know on a practical sense, that all sounds great. But you actually, if you want the artist to physically sign it, if the buyer wants

that, then at what point do you get ... how many times do you bother them to sign it, and logistically how do you get them to them etc. etc. So,

I mean, we have a print edition in the exhibition just now, John Goto exhibition which we made with him. It's a double sided digital print, with one side has a layer of [unclear-1:31:18] varnish on it and he [sl] wants to produce an edition of 50, at the moment we've only produced 10, an edition of 10 which is about 15 prints with proofs and all the rest of it. So just from the point of view of timescale we're asking, we haven't physically had time to produce all 50. But also, you know, we didn't want to do that up front. [No] So we come to the point that we're ... they're going away, they're selling and wanting to be in various places, then we'll print the rest of the edition I think [Yeah] rather than doing another ten. (Edinburgh-Printmakers, 2011)

Like a digital original? I would say if it's something that is created by the artist on the computer and they then print it on the ink jet. I think that we really haven't had a lot of that, people have done it but they tended to print it on photographic paper rather than Somerset which is quite interesting because in my opinion it kind of brought out the harshness of it rather than the Somerset's are great at introducing a softness to it. So they weren't signing them, which is the thing. I guess again we haven't come up against this, if people want to sign them, I think there would be a lot on how it was presented as a digital print. You know, if they were signing it by pencil or whatever, which obviously you wouldn't do on a photographic paper anyway, which is the experience we've had over here(Highland-Print-Studio, 2011)

We don't need to print the whole edition at one time also the thing with the digital is you can change the scale, so we touched on that earlier, you can change the scale. Again I've been watching this develop over the last couple of years you know 'could I have an edition that's in two sizes?' Can you? I don't know, is that part one, is that part two? So a lot of people are facing dilemmas about that, what they want to do.(Glasgow-Print-Studio, 2011)

The thing is whether the artist's intentions are a very strict part of the process. For example they specify it has to be printed on such and such

paper; of such and such weight and so forth. Or whether it ends up getting printed on any old paper. And it might end up on the wall looking pretty You know those things like is it called Red Bubble where you can, you can sort of sell them your, your image file and then they take it and if a customer buys it they buy it at the various sizes depending on the size of your files and all of that. I, I don't like that idea to do it myself but ...Well the, the digital prints and people who think ... I'm, I'm concerned about you know a ten year gap. I would personally want to have some integrity and I would feel that if I produce something I would want it to be editioned in whatever format at the moment in time then that would be it. I would not be keen ...(Fife&Dunfermline-Print-Studio, 2011)

Some of them, as I was talking before about printing on demand, eventually I can see that we might have an (Espresso) machine where people can come in and order something that's a free download somewhere in the world and we'll print it out for them or even assemble a book in one of these machines, an espresso machine sort of thing. It's something we'd be interested in, we did, when I was putting in the application for new equipment we were looking at these Espresso [machines (*The **Espresso Book Machine** (EBM) is a print on demand (POD) machine that prints, collates, covers, and binds a single book in a few minutes. A single machine can cost from \$97,000 plus printer.^[11]*). but at the moment they're still very limited to only printing out of copyright material, well that might have changed since I was looking at it, but it certainly wasn't appropriate for us, just now. I'm sure it is becoming very rapidly possible to download artist's books, copyright material, and make them, if the mechanism was there to pay the necessary fees and dues to artists, then we would be interested in having that. I think DCA as an organisation, not just the print studio, would express excitement about the possibilities of being able to do that in DCA ...(DCA-Print-Studio, 2011)

Again, the same applies to other print processes. Eg - A plate can be etched and printed years later. Personally, I'd see it as 'unfinished'. Also, with technology changing so rapidly I'd worry that files could be out-dated quickly.(Peacock-Print-Studio, 2011)

4.5 Authenticity.

Well I think certainly I would expect them to sign them somewhere, on the back. [Signature] Signature is definitely the most straightforward way that we know that it's not someone else having brought in some facsimile of their work, of someone else's work. Doesn't necessarily answer the question of whether it's an original print or reproduction you know that's been used in a reproductive way, but if it's been signed it's certain that you know where it's coming from. I think that what's quite interesting is how much printmakers are [sl] talking about this. And I don't know, it seems, you know, digital print goes in between all those different, all the different areas of art practice anyway and I don't think that artists that wouldn't classify themselves as printmakers are all that interested in a lot of these issues. I think the reason we talk about the other sides of things like is it good enough, is it real, does it have value; is because of the tradition of elevating value with original prints and signed limited edition adding a certain aspect of preciousness I do think that ... it just calls into question the ideals of why original prints are elevated. Why we believe they should be elevated because it has caused a lot of the descriptions I would've used 10 years ago to be redundant. You know, it's not necessarily been through a printing press. [Yeah] Okay, it might have had some interaction with some kind of gadget but, you know, it's not necessarily ... it just really makes it very broad. And as I say, I don't think the artist is generally all that interested in all that. It's the buyer; it's how to get that over to the buyer. (Edinburgh-Printmakers, 2011)

You know it's not just protection it's promotion of the original print as well because that's what we like to be about so I think for instance if you set it around Giclee then you're shooting yourself in the foot (Highland-Print-Studio, 2011)

I go back to what I said before; the artist has to be involved in the matrix. & Traditional (signature), we just go for a traditional way of presenting fine art prints, which is edition number, title, signature, date if you want it. (Glasgow-Print-Studio, 2011)

Well it's the artist's ideas, content, intentions, um, being very much you know the object (– the) product. But essentially the artist is controlling all of the process. We might have somebody who was become... becoming fairly new to etching or whatever and they would get assistance but they'd still be controlling it. (Fife&Dunfermline-Print-Studio, 2011)

Well I think authenticity is something that needs to be questioned, constantly re-examined and re-evaluated. Again you go back to Benjamin and the advent of photography, when everybody was questioning authenticity; the advent of I don't know, engraving over hand-drawn, the printed book over the scribe's book almost. I don't think there's ever going to be a final conclusion about it and I think I would go back to what I said before about if the method of production is authentic to the artist's concept and it's well used then that is the criterion really.

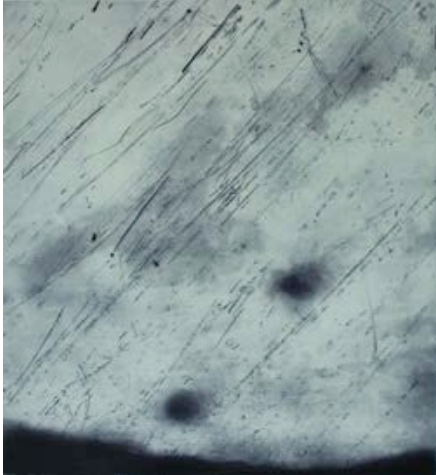
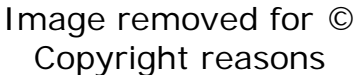
If we're in control and if we're talking about editions that we do with artists then I would expect to have quite intense discussions with each artist about say, if we were using a digital method if that method was appropriate, if it was the most authentic way. If it has some kind of root in their work, either because it's something they've never done before or because it echoes their working practice in some other way, a sculptor for instance. So we would have quite intensive conversations around all that, I can't guarantee that for all the members who come in and do their own thing obviously - although we do get into discussions about it frequently. And we would, if we saw someone coming in, printing out loads of digital prints as editions we'd probably have a bit of a word with them about how they're selling it and that sort of thing but ...

We haven't set any, any rules, with the hand-made prints, the traditional hand-made prints we tend to stick around 30 to 50 at an absolute maximum. But downstairs they edition screen prints by the thousand, or they have on occasion, so we might collaborate on that. If we had an artist who wanted to produce, conceptually produce, an edition of 5,000, we might collaborate with the Visual Research Centre downstairs to produce that because our machines are all geared up for hand-printing and quite slow work whereas that is automated But in terms of concept it again

comes back to the artist's idea and edition numbers can be an important part of that concept I think. (DCA-Print-Studio, 2011)

(Authenticity in a digital context is..)An original image created by the artist purely as a digital print, that has not existed in any other form. As with other prints - This is an original, editioned fine art print that is a result of a true collaboration between artist and printmaker. It did not exist prior to this collaboration and could not be made in any other way. It is not a reproduction of any pre existing artwork.(Peacock-Print-Studio, 2011)

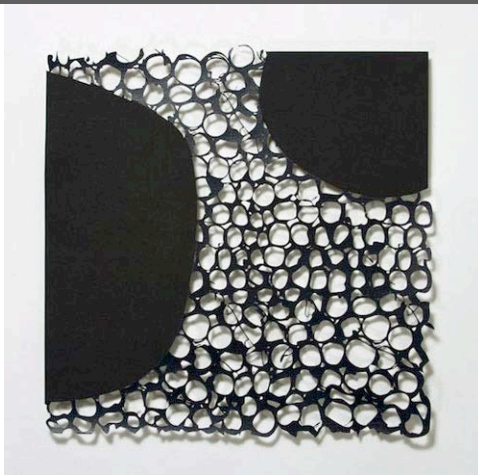
APPENDIX IV Key Examples Gathered from 3 Printmaking Exhibitions¹

Example A	Artist - Debora Ando	
Utilising traditional intaglio techniques of spitbite and dry point on paper Ando's work, which is limited by edition, evidences the key markers of a traditional work.		TRADITIONAL PRACTICE
Details	Poeira de São Paulo, 2009 Spitbite and dry point Paper 25.5 x 23.5cm, Image 24.5 x 22.5cm Printed on Hahnemühle, 330gsm In an edition of 4 with 2 Artist's Proofs	
Classification	TRADITIONAL MATRIX + TRADITIONAL PRINT METHOD = PRINT 1.0 (TRADITIONAL PRINT ART)	
Example B	Artist - Grazyna Dobrzelecka	
Although contemporary in its use of a found object as matrix this work shows the key markers of a traditional work.		TRADITIONAL PRACTICE
Details	Torsos, 2009 Relief print from chopping board Paper 56 x 76cm, Image 62 x 82cm Artist's Proof	
Classification	TRADITIONAL MATRIX + TRADITIONAL PRINT METHOD = PRINT 1.0 (TRADITIONAL PRINT ART)	

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- ¹ The Northern Print Biennale. Northern Print Studio Newcastle / Gateshead 2009
 - Exhibitions IMPACT 6 UWE Bristol 2009
 - Digital Pioneers Julie & Robert Breckman Prints and Drawings Gallery, Room 90 and Paintings, Room 88a V&A London 2009 /10

Example C	Artist – Jenny Smith
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Smith's work is originated from traditional matrix and innovatively finished through digital process. In meeting the criteria for a Hybrid 1A



NEW FORM - EARLY ADOPTER

Details	<p>Circles II, 2009</p> <p>Laser cut screenprint Paper 37 x 37cm edition 12</p>
Classification	TRADITIONAL MATRIX + DIGITAL PRINT METHOD = PRINT HYBRID 1A

Example D	Artist – Paul Coldwell
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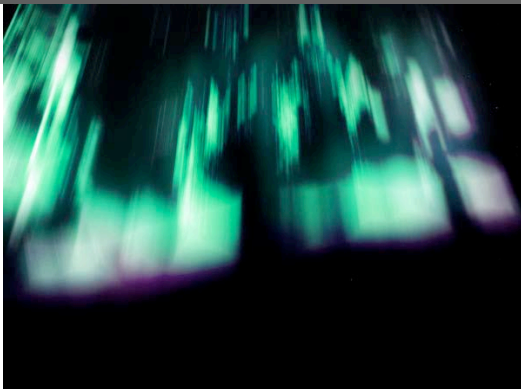
This example of Coldwell's work was digitally mediated from digital photographic and vector graphic software. The photopositives for the traditional print method were then digitally originated. Thus comprising a print hybrid 1B



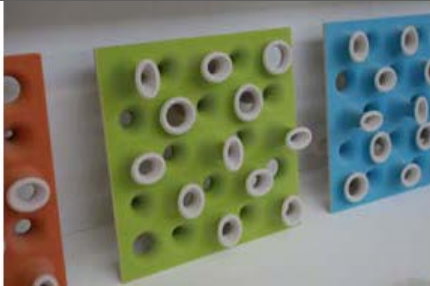

NEW FORM – EARLY ADOPTER

Details	<p>Framing Nature - Trees, 2008</p> <p>Screenprint Paper 75 x 100cm, Image 54 x 80cm Printed on Somerset, 360gsm by Advanced Graphics In an edition of 15 with 1 Artist's Proof</p>
Classification	DIGITAL MATRIX + TRADITIONAL PRINT METHOD = PRINT HYBRID 1B

Example E	Artist - David Osbaldeston	
Osbaldeston's work indicates adoption of both digital matrix and digital print methods and additionally evidences new forms of instantiation as an installation	<p>Image removed for © Copyright reasons</p>	NEW FORM – EARLY ADOPTER
Details	<p>Another Shadow Fight, 2008 Digital inkjet prints on mdf installation Installation size variable, prints 119 x 84 cm each Unique Courtesy of Matt's Gallery</p>	
Classification	DIGITAL MATRIX + DIGITAL PRINT METHOD = PRINT 2.0 (NEW PRINT ART)	

Example F	Artist – Alastair Clarke	
Although sourced from autographic gestural marks with paint the subsequent production and processing of this work is entirely digital meeting the criteria for print 2.0		NEW FORM - EARLY ADOPTER
Details	<p>Skylight, 2005 Pigment inkjet print Image size 74 x 100 cm Somerset Velvet Enhanced</p>	
Classification	DIGITAL MATRIX + DIGITAL PRINT METHOD = PRINT 2.0 (NEW PRINT ART)	

Example G		Artist – Bren Unwin	
<p>Unwin's research based installation uses both digital matrix and digital print methods (extended to projection – transfer of image to surface using light) and additionally evidences multiple forms of instantiation as temporal and physical print</p>		 	<p>NEW FORM – EARLY ADOPTER</p>
Details	<p>Medium and Meaning, 2009 Digital mediated prints and projection Installation size variable, Unique - repeatable</p>		
Classification	<p>DIGITAL MATRIX + DIGITAL PRINT METHOD = PRINT 2.0 (NEW PRINT ART)</p>		

Example H		Artist – Peter Walters	
<p>Part of the CFPR 3d printing research group Walters work examining 3D printing is a prime example of the new forms of printmaking 2.0</p>		 	<p>NEW FORM - EARLY ADOPTER</p>
Details	<p>3D prints, 2009 Colour 3D prints size various</p>		
Classification	<p>DIGITAL MATRIX + DIGITAL PRINT METHOD = PRINT 2.0 (NEW PRINT ART)</p>		

Example I	Artist – Frieder Nake	
<p>Nake identified as a “Digital pioneer” form one of a group at the leading edge of the computational medium provided models, which are currently being exploited as new forms by early adopters.</p>	NEW FORM - INNOVATOR	
	Image removed for © Copyright reasons	
Details	<p>Walk through – Raster Vancouver Version 1972 Screenprint 50.6 x 50.6cm Printed on paper In an edition of 25</p>	
Classification	3) DIGITAL MATRIX + TRADITIONAL PRINT METHOD = PRINT HYBRID 1B	

Example J	Artist – AARON (a computer programme written by Harold Cohen)	
<p>Cohen's work in coded computer originated and mediated work places him as with Nake as one of a group at the leading edge of the computational medium providing models, which are currently being exploited as new forms by early adopters.</p>	NEW FORM - INNOVATOR	
	Image removed for © Copyright reasons	
Details	<p>Digital print on paper 2003 prints 123 x 177 cm UK / USA 2003</p>	
Classification	DIGITAL MATRIX + DIGITAL PRINT METHOD = PRINT 2.0 (NEW PRINT ART)	

APPENDIX V Bibliography

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- RESPONDENT-9 2011. Extended Artist's Survey Response Henshaw, R. Co.Down / Northern Ireland.
- RESPONDENT-10 2011. Extended Artist's Survey Response Petrie, R. Glasgow / Scotland.
- RESPONDENT-11 2011. Extended Artist's Survey Response Faure Walker, J. London / England.
- RESPONDENT-12 2011. Extended Artist's Survey Response Cornell, D. Lincoln, MA / USA.
- RESPONDENT-13 2011. Extended Artist's Survey Response Freeman, H.D. Charlotte, NC / USA.
- RESPONDENT-14 2011. Extended Artist's Survey Response Holmquist, A. La Plate / USA.
- RESPONDENT-15 2011. Extended Artist's Survey Response Krause, D.S. Marshfield Hills, MA / USA.

RESPONDENT-16 2011. Extended Artist's Survey Response Murphy, J.
Charlotte, NC/ USA.

RESPONDENT-17 2011. Extended Artist's Survey Response Tolley, R. NC. /
USA.

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